THE JOURNAL
of the American Medical Association
*Published Under the Auspices of the Board of Trustees*

VOL. 163, NO. 12 CHICAGO, ILLINOIS MARCH 23, 1957
COPYRIGHT, 1957, BY AMERICAN MEDICAL ASSOCIATION

# ROCKY MOUNTAIN SPOTTED FEVER

Edward P. Cawley, M.D.
and
Clayton E. Wheeler, M.D., Charlottesville, Va.

• *Rocky Mountain spotted fever was diagnosed in 74 patients at the University of Virginia Hospital from 1945 through 1954. During the same 10-year period the total number of cases reported in Virginia was 744 and the total for the United States was 4,517. Four case histories are given to illustrate the course of the disease, the history of exposure to tick bites, the recovery of youthful patients without specific treatment, and the fatal outcome in an older patient despite treatment. Persistent fever and a cutaneous eruption were the earliest dependable clinical findings suggesting the diagnosis. Among diagnostic tests, the Proteus-agglutination reaction is the most widely used, and the results were almost always positive by the 10th to 15th day of the disease. Treatment should be undertaken promptly without waiting for final diagnosis. The advent of the antibiotics, particularly chlortetracycline hydrochloride, oxytetracycline, and chloramphenicol, has greatly improved the prognosis.*

The term "Rocky Mountain spotted fever" was for many years practically synonymous with a rickettsial disease that occurred in persons in the Rocky Mountain states. More recently, however, it has been shown that the disorder is also endemic in the South Atlantic states, and cases are now reported from all sections of the United States.[1] As implied by its name, a cutaneous eruption is one of the salient features of Rocky Mountain spotted fever and is probably the most typical clinical finding. This paper is based in part on 74 cases of Rocky Mountain spotted fever seen at the University of Virginia Hospital during a recent 10-year period.

## Epidemiology

The occurrence of several hundred cases of Rocky Mountain spotted fever is reported in the United States each year, and it is probable that the incidence of the disease is even higher than these figures indicate. The two most widely publicized foci of Rocky Mountain spotted fever in the United States are located in three Rocky Mountain states (Colorado, Montana, and Wyoming) and in three South Atlantic states (Maryland, Virginia, and North Carolina), but numerous cases of the disease are also reported from other sections of the country (fig. 1). During the 10-year period 1945 through 1954, 744 cases of Rocky Mountain spotted fever were reported in Virginia, and 74 of these cases were encountered at the University of Virginia Hospital. During this same period, 4,517 cases of the disease were reported in the United States as a whole.[1]

Dermacentor variabilis, which is sufficiently adapted to the dog to justify its being called the American dog tick (fig. 2 *inset*), and Dermacentor andersoni, the wood tick, which is a parasite of large wild animals, are the two most important vectors in the transmission of Rocky Mountain spotted fever to humans.[2] In the United States, the dog tick is found in the Great Plains region eastward to the Atlantic Coast and is especially abundant in the South Atlantic states. The wood tick is found throughout the Rocky Mountain region and in adjacent areas.[2] The seasonal incidence of Rocky Mountain spotted fever (most cases are encountered during the warm months) parallels the seasonal prevalence of the dog tick and the wood tick.[3] The high incidence of Rocky Mountain spotted fever in children in the South Atlantic states as compared with that in the Rocky Mountain states, where the incidence is higher among adults, can be explained on the basis of the proximity of the vectors to humans of various age groups.[2] The number of infected ticks in nature is variable, but it has rarely been found to exceed 3%, even in highly endemic areas, and is usually on the order of one in many thousands.[4] The tick is apparently not affected by the infestation and serves as a reservoir in nature as well as the vector.[2]

The causative organism of Rocky Mountain spotted fever, a Rickettsia organism, was described in 1919 and is known as Rickettsia rickettsii or Rickettsii der-

From the Department of Dermatology, University of Virginia School of Medicine.
Read before the Section on Dermatology at the 105th Annual Meeting of the American Medical Association, Chicago, June 12, 1956.

macentroxenus.[5] The organism is introduced into human skin with the salivary gland secretions of the tick during the act of feeding.[6] The presence of blood in the intestinal tract of the tick for two to eight hours apparently stimulates the organism in some fashion so

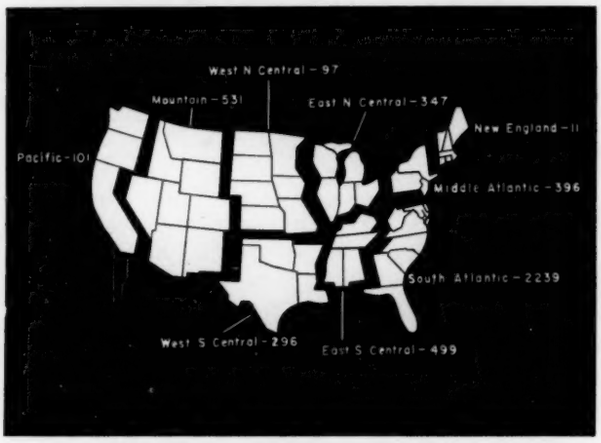
West N Central - 97
Mountain - 531
East N Central - 347
New England - 11
Pacific - 101
Middle Atlantic - 396
South Atlantic - 2239
West S Central - 296
East S Central - 499

Fig. 1.—Map showing number of cases of Rocky Mountain spotted fever reported from various sections of the United States during the 10-year period 1945 through 1954. (Data from National Office of Vital Statistics.[1])

that its virulence and infectivity are increased.[2] Viable Rickettsia organisms have been isolated from lymphatic tissues of a patient one year after apparent recovery from Rocky Mountain spotted fever.[7]

It appears that no reservoir host other than the tick is required for the development of Rocky Mountain spotted fever, which makes the disease unique among

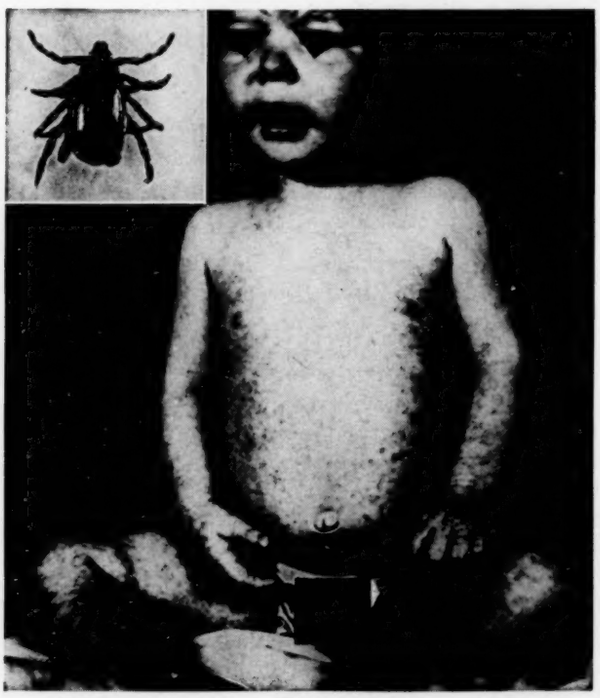

Fig. 2.—Cutaneous eruption in child with Rocky Mountain spotted fever. *Inset*, photograph of American dog tick.

arthropod-borne diseases of man.[4] Recently, however, the recovery of a strain of Rickettsia belonging to the spotted fever group (presumably Rickettsia rickettsii) from the tissues of a wild meadow mouse has been described.[8] This is the first time the organism has been isolated from a wild and naturally infected animal in the United States.[8] Although dogs and several other animals can be experimentally infected with the organism that produces Rocky Mountain spotted fever, the infection is mild or silent and no visible diagnostic lesions or distinctive febrile reaction occurs.[2]

## Clinical Aspects

The clinical picture of Rocky Mountam spotted fever varies from a mild to a severe and sometimes fatal illness. The usual incubation period is from four to eight days, and the prodromal manifestations include headache, anorexia, and malaise. The onset of the disease is usually brusque and is ushered in by the occurrence of headache, chills, and aches and pains in muscles and joints. Up to this point, Rocky Mountain spotted fever resembles the early stages of other febrile illnesses in most respects. The fever rises abruptly within the first 24 hours after the onset of the disease, reaches 103 to 104 F (39.4 to 40 C), and persists, with variations, until the acute phase of the disease subsides.[3]

Fig. 3.—Palmar lesions in patient with Rocky Mountain spotted fever.

The cutaneous eruption, which is the most characteristic finding and a prerequisite to the early diagnosis of Rocky Mountain spotted fever, usually appears on the second to fourth day of the disease[3] (fig. 2). It develops first on the flexural surfaces of the wrists and ankles and spreads within two or three days to other parts of the cutaneous surface. The palms and soles are almost always involved (fig. 3). The initial lesions are discrete, erythematous maculas, a few millimeters in diameter, that blanch on diascopy. Within a matter of hours or a few days at most, the lesions assume a dusky-red or purpuric hue and no longer blanch on pressure. If the disease is severe and progressive, the lesions may take on a maculopapular character, may increase in size, and may coalesce, ultimately involving the entire cutaneous surface. Gangrene of terminal parts of the body, including the genitalia, may occur. The mucous membranes of the oral cavity and pharynx may be involved, especially in severe cases. The cutaneous efflorescence fades gradually during the period of recovery and sometimes leaves hyperpigmentation at the sites of antecedent lesions. In addition to the fever, cutaneous eruption, headache, malaise, and

aches and pains in muscles and joints, numerous other manifestations, including edema, prostration, lethargy, delirium, photophobia, hyperesthesia of the skin and muscles, enlargement of the spleen, and abnormal neurological signs, may be encountered in the course of Rocky Mountain spotted fever.[2]

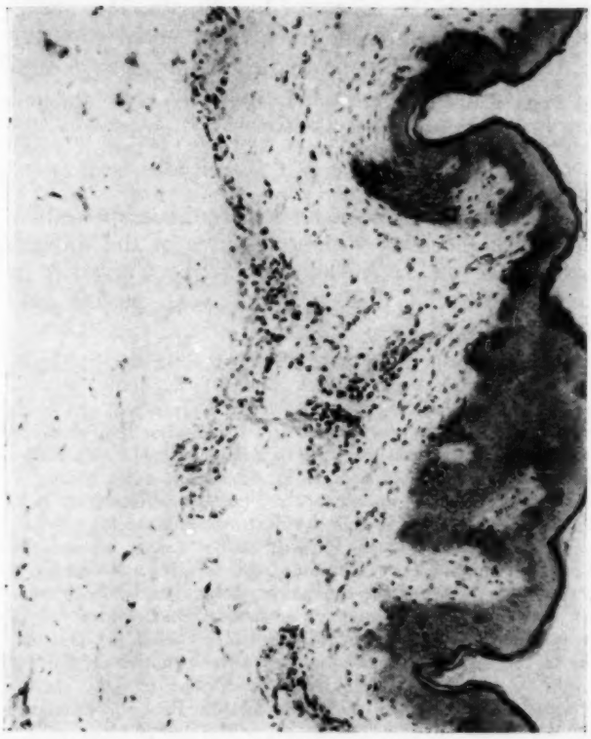

Fig. 4.—Photomicrograph of specimen from a cutaneous lesion of Rocky Mountain spotted fever, showing involvement of capillaries in the dermis ( × 125).

The clinical course of Rocky Mountain spotted fever varies from mild infections during which the patient is scarcely ill to severe infections that cause death within a few days. The average mortality rate for patients with untreated Rocky Mountain spotted fever has been calculated as approximately 13% for those under 40 years of age and approximately 41% for patients above that age.[9] When sequelae occur, they are usually referable to the central nervous system and include deafness, visual disturbances, slurring in speech, and mental confusion.[9]

## Diagnosis

The diagnosis of Rocky Mountain spotted fever may be obscure in mild or fulminating cases of the disease but is usually not difficult in the average case if the disease is kept in mind and if a history of recent exposure to ticks or of a tick bite is elicited. A persistent fever and a characteristic cutaneous eruption are the earliest reliable clinical manifestations. In the prodromal stage of Rocky Mountain spotted fever, and before the cutaneous eruption has appeared, the disorder resembles other febrile illnesses. After the eruption has evolved, Rocky Mountain spotted fever may have to be distinguished from such diseases as meningococcemia, typhoid, endemic typhus, measles, and dermatitis medicamentosa.

The Proteus-agglutination and the complement-fixation tests, animal-inoculation studies, and microscopic examination of biopsy specimens taken from cutaneous lesions are useful laboratory procedures in establishing the diagnosis of Rocky Mountain spotted fever. The Proteus-agglutination reaction, although not specific for Rocky Mountain spotted fever, is probably the most widely employed laboratory test, and results are almost always positive by the 10th to the 15th day of the disease. Examination of the blood and urine usually shows normal results, although there may be a moderate degree of leukocytosis, and a secondary anemia of normochromic type may develop late in the course of the disease.[3] In a few patients, urinary findings show the presence of acute nephritis.[3] In the spinal fluid, an increase of mononuclear cells, indicative of the encephalitis that often accompanies Rocky Mountain spotted fever, is frequently present.[3]

The fundamental histopathological lesions in Rocky Mountain spotted fever are found in and immediately adjacent to small blood vessels[10] (fig. 4, 5, and 6). Such lesions may occur in any tissue or organ of the body,[6] including the heart, lungs, liver, and kidneys, but they are especially conspicuous in the skin, subcutaneous tissue, and the central nervous system. These vascular lesions are characterized by endothelial swelling and proliferation, which may progress to occlusion, necrosis, or thrombosis of the vessels.[10a] They are frequently accompanied by a perivascular cellular infiltrate that is comprised of a multiplicity of cell types, varying with the stage and severity of the lesion, including polymorphonuclear leukocytes, lymphocytes,

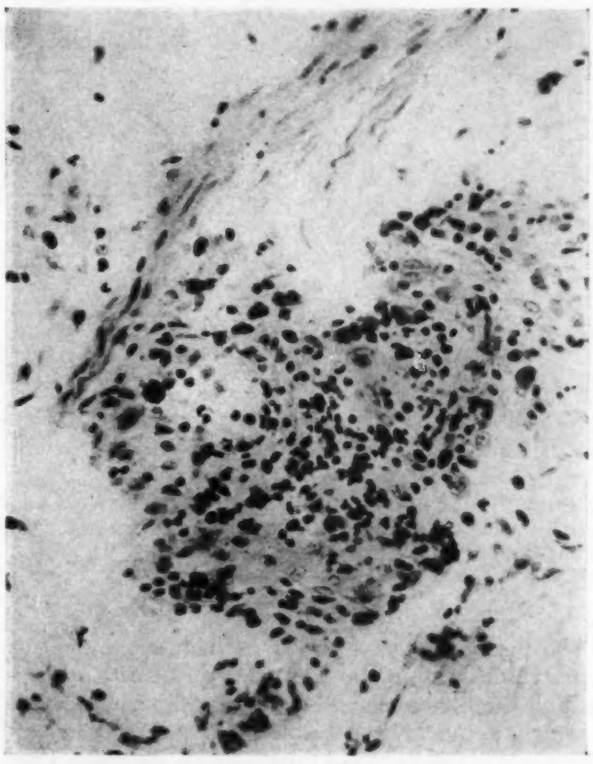

Fig. 5.—Photomicrograph of vascular lesion in the dermis from patient with Rocky Mountain spotted fever, showing pericapillary accumulations of cells that are chiefly mononuclear in type ( × 250).

plasma cells, monocytes, and macrophages.[10a] Rickettsia organisms may be found in the endothelial cells as well as in smooth muscle cells of the media and in cells of the perivascular infiltrate.[6] The vascular alterations account for and can be correlated with the clinical manifestations of the disease, including the cutaneous eruption.

It is worth emphasizing that no laboratory procedure is consistently reliable in making the diagnosis of Rocky Mountain spotted fever during the first week or 10 days of the illness. A high index of suspicion on the part of the physician, a history of the patient's recent exposure to ticks, and an accurate evaluation by the physician of clinical manifestations, with special attention directed to the cutaneous efflorescence, are of paramount importance in making a diagnosis during this phase.

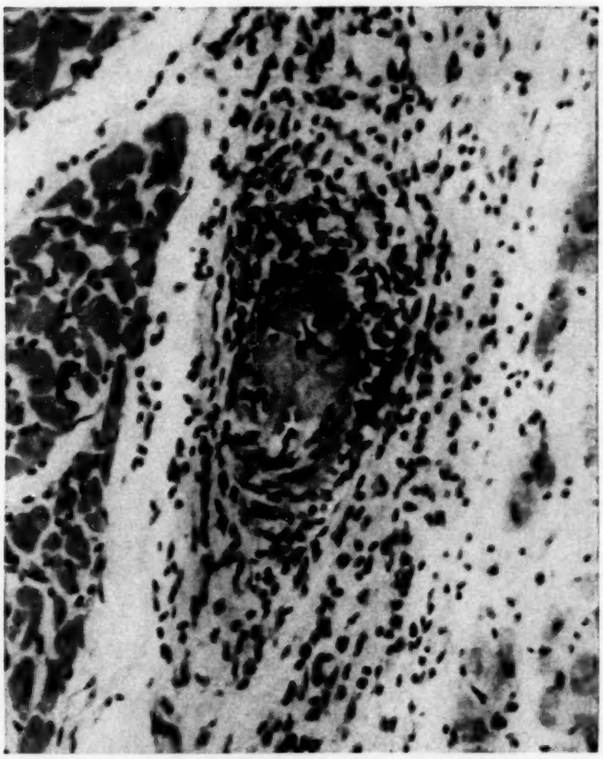

Fig. 6.—Photomicrograph of specimen of myocardium from patient with Rocky Mountain spotted fever, showing endothelial swelling and thrombosis of the vessel and a perivascular infiltrate comprised of several types of cells (× 270).

## Treatment

The most effective form of individual prophylaxis against Rocky Mountain spotted fever consists of preventing the attachment of a tick to the skin or in removing it as quickly as possible if it becomes attached.[2] This necessitates frequent inspection of the scalp, skin, and clothing while persons are in tick-infested country. It is especially important that the scalp of children, which is frequently overlooked, and particularly of those children with long hair, be examined at frequent intervals when they are in geographical areas in which the dog tick is abundant. A useful vaccine against Rocky Mountain spotted fever is available, but it must be readministered each year in order to be effective.

From the standpoint of specific therapy, the advent of the antibiotics, which include chlortetracycline, (Aureomycin) hydrochloride, oxytetracycline (Terramycin), and chloramphenicol (Chloromycetin), has greatly improved the prognosis in Rocky Mountain spotted fever, especially if treatment with these agents is started early in the course of the disease. The use of the sulfonamides, which have been noted to make the disease worse,[2] is contraindicated. Supportive therapy is of utmost importance, especially in severe and complicated cases of the disease.

## Report of Cases

The following cases of Rocky Mountain spotted fever, which illustrate various features of the disease, were among the 74 encountered at the University of Virginia Hospital during the 10-year period 1945 through 1954.

Case 1.—A male, aged 13, was admitted to the University of Virginia Hospital on June 23, 1945. He had noted the abrupt onset of headache, backache, malaise, anorexia, and chills and fever three days previously, and his mother had observed a widespread cutaneous eruption that appeared 24 hours before the boy's admission to the hospital. There was not a history of a tick bite, but the youngster had removed numerous ticks from his dog with his fingers during preceding weeks.

Examination showed the patient to be acutely ill and dehydrated. He had an erythematous, macular eruption that faded on diascopic pressure on the palms, soles, hands, feet, arms, legs, and trunk. The mucous membranes were not involved by the eruption. His temperature was 102 F (38.9 C). The results of the Proteus-agglutination test were negative on the day of admission but were positive in a dilution of 1:80 on the 10th day of the disease and in a dilution of 1:1,280 on the 16th day of the disease. The results of the complement-fixation test for Rocky Mountain spotted fever were positive in a dilution of 1:128 on the 27th day of the disease. Other laboratory studies gave normal results. The diagnosis of Rocky Mountain spotted fever was made. The cutaneous eruption disappeared within a few days after the patient's admission, and the fever gradually subsided over a period of 10 days. The boy was apparently well at the time of discharge. No specific treatment was employed.

Case 2.—A male, aged 5, was admitted to the University of Virginia Hospital on June 24, 1947. Ten days previously his parents had noticed that he was feverish, listless, and lethargic. These symptoms persisted, and, five days before admission, the boy was found to have several "red spots" on his arms and was thought to have measles. A similar eruption soon appeared on his legs, face, and trunk. The parents had removed a tick from the child's scalp about a week before he became ill, and they stated that several other ticks had been removed from the boy's skin during preceding weeks.

Examination at the time of admission showed the child to be acutely ill. His temperature was 104 F (40 C). His skin was hot and dry, and there was a dusky-red, maculopapular eruption on his face, neck, trunk, and extremities. The scleras were injected, and the tip of the spleen was palpable 3 cm. below the costal margin. The results of the Proteus-agglutination test were negative on the day of the patient's admission but positive in a dilution of 1:1,280 six days later, which was approximately the 16th day of the disease. Other laboratory studies gave normal results. The diagnosis of Rocky Mountain spotted fever was made. The child was treated with *p*-aminobenzoic acid and made an uneventful recovery.

Case 3.—A male, aged 44, was admitted to the University of Virginia Hospital on July 22, 1949. The patient was delirious at the time of admission, and the history, as obtained from a relative, was sketchy and fragmentary. The patient had been drinking heavily for about 12 months, and several ticks had been removed from his skin during preceding weeks. About five days prior to admission, he became feverish and delirious

and remained so. He also developed an eruption, but it was impossible to learn when this began or where it first appeared on the skin.

Examination at the time of admission showed the patient to be unkempt and delirious. He had a cutaneous eruption that was most pronounced on his extremities but that also was present on his trunk and was comprised of purpuric lesions that varied considerably in size. His temperature was 103 F (39.4 C). A tick was discovered in and removed from the right external auditory canal. Urinalysis showed 2+ albuminuria, the presence of 2 to 4 white blood cells per high-power field, innumerable red blood cells per high-power field, and occasional granular casts. The results of the Proteus-agglutination test were negative on the day of the patient's admission but positive in a dilution of 1:128 on the fifth day of hospitalization. A specimen was removed from one of the cutaneous lesions for microscopic examination. The dermal vessels showed endothelial swelling and proliferation, and there were perivascular accumulations of mononuclear cells around many of the vessels. The pathologist felt that the findings were consistent with but not diagnostic of Rocky Mountain spotted fever. The diagnosis of Rocky Mountain spotted fever was made on the basis of clinical findings and the results of laboratory tests. The patient continued to be delirious and critically ill despite treatment with chloramphenicol and *p*-aminobenzoic acid and died on the sixth day of hospitalization. Permission for autopsy was not granted.

Case 4.—A male, aged 16, was admitted to the University of Virginia Hospital on Aug. 10, 1953. He had been well until five days prior to admission, at which time he complained of headache, nausea, and vomiting, and it was noted by his family that he was somewhat confused and that he had a few "red spots" on his feet. The boy was admitted to his local hospital, where a lumbar puncture was performed. During his stay in the local hospital, he became delirious and fell out of bed several times. His family stated that the boy had had numerous tick bites during several weeks preceding the onset of his illness.

Examination at the time of the patient's admission to the University of Virginia Hospital showed the boy to be acutely ill and delirious. He had a mixed erythematous and dusky-red, maculopapular eruption on his palms, soles, hands, feet, and legs. His temperature was 105 F (40.5 C). The results of the Proteus-agglutination test were negative on the day of admission but positive in a dilution of 1:1,280 12 days later. Other laboratory examinations, including examination of the spinal fluid, gave normal results. A tentative diagnosis of Rocky Mountain spotted fever was made at the time of admission, and the boy was treated with chloramphenicol. He recovered after the disease had run a stormy course, during which hemorrhagic and superficially gangrenous lesions developed on his scrotum. He was discharged, apparently well, on the 15th day after admission.

## Comment

Figure 1 shows the number of cases of Rocky Mountain spotted fever reported from various sections of the United States during the 10-year period 1945 through 1954. The South Atlantic, Mountain, Central Southeastern, Middle Atlantic, Central Northeastern, and Central Southwestern states recorded significant numbers of cases during this decade. The disease was reported relatively infrequently from the New England, Central Northwestern, and Pacific states during the same interval. Approximately as many cases (2,239) were reported from the South Atlantic states during the period as from all other sections of the country combined (2,278). Despite a recent gradual decrease in the total number of cases reported each year for the United States as a whole,[1] Rocky Mountain spotted fever continues to be an important disease in the United States, and its occurrence in several geographical sections other than those formerly listed as endemic foci makes it a disease to be reckoned with by physicians in most parts of the country.

Of 74 cases of Rocky Mountain spotted fever encountered at the University of Virginia Hospital during the 10-year period 1945 through 1954, 31 occurred in patients under the age of 12 years, 13 in patients between 12 and 30 years, 10 in patients between 30 and 50 years, 17 in patients between 50 and 70 years, and 3 in patients more than 70 years of age. These statistics illustrate the relatively high incidence of the disease among children in the South Atlantic states. Of the 74 patients, 45 were males and 29 were females; 67 were white and 7 were Negro. Most of the patients were from rural areas. In several of the 74 cases there was not a history of tick bite, but most of these patients had removed ticks from dogs with their fingers. Five of the 7 deaths in this series of 74 cases occurred in patients who were more than 55 years of age, one occurred in a patient aged 44, and one in a child aged 6. This emphasizes the relation of age to prognosis.

Persistent fever and a cutaneous eruption appeared to be the earliest dependable clinical manifestations of Rocky Mountain spotted fever in this group of 74 cases. The eruption was sometimes difficult to detect in dark-skinned patients but could usually be demonstrated on the palms and soles in such cases. Of the readily available laboratory examinations, the Proteus-agglutination test was the most consistently useful in this series. Evidence accumulated from the 74 cases suggests that specific treatment with antibiotics known to be effective should be undertaken promptly in patients suspected of having Rocky Mountain spotted fever, even though the diagnosis may not have been firmly established.

The picture of the child in figure 2 was supplied by Dr. McLemore Birdsong.

### References

1. Morbidity and Mortality Weekly Report, United States Department of Health, Education, and Welfare, National Office of Vital Statistics, Annual Supplement, 1946-1955.

2. Harrell, G. T., Jr.: Rocky Mountain Spotted Fever, Medicine **28**:333-370 (Dec.) 1949.

3. Baker, G. E.: Rocky Mountain Spotted Fever, M. Clin. North America **35**:907-930 (May) 1951.

4. McCroan, J. E.; Ramsey, R. L.; Murphy, W. J.; and Dick, L. S.: Status of Rocky Mountain Spotted Fever in Southeastern United States, Pub. Health Rep. **70**:319-325 (March) 1955.

5. Wolbach, S. B.: Studies on Rocky Mountain Spotted Fever, J. M. Res. **41**:1-197 (Nov.) 1919.

6. Wolbach, S. B.: Pathology of Rickettsial Diseases of Man, in Rickettsial Diseases of Man, Washington, D. C., American Association for the Advancement of Science, 1948, p. 118.

7. Parker, R. T., and others: Persistence of Rickettsia Rickettsii in Patient Recovered from Rocky Mountain Spotted Fever, J. Immunol. **73**:383-386 (Dec.) 1954.

8. Gould, D. J., and Miesse, M. L.: Recovery of Rickettsia of Spotted Fever Group from Microtus Pennsylvanicus from Virginia, Proc. Soc. Exper. Biol. & Med. **85**:558-561 (April) 1954.

9. Topping, N. H.: Rocky Mountain Spotted Fever, Note on Some Aspects of Its Epidemiology, Pub. Health Rep. **56**:1699-1703 (Aug. 22) 1941.

10. (*a*) Lillie, R. D.: Pathology of Rocky Mountain Spotted Fever, Bulletin 177, National Institutes of Health, United States Public Health Service, 1941. (*b*) Footnote 6.

# ENDOCRINE THERAPY OF PROSTATIC CARCINOMA

Edward H. Ray, M.D., Lexington, Ky.

• *During the past 15 years, 553 patients who had carcinoma of the prostate were treated with castration, endocrines, or a combination of the two methods. The endocrines used were of the estrogen group. Immediate bilateral orchiectomy is advocated to eliminate the largest source of androgens. Experience indicates it might be best to withhold endocrine therapy from those patients with a low-grade carcinoma, without evidence of metastasis, and whose clinical course is satisfactory. This approach may add extra years of life for the patient. The benefits of adrenalectomy are so meager and of such short duration that further use of this procedure should be discouraged.*

This report is based on my own experience and that of my associates in treating 553 men with carcinoma of the prostate since late in 1941, at which time we began using endocrine therapy. This included castration alone in some and administration of estrogens alone in some, but a combination of the two was used in most. Immediate bilateral orchiectomy has been advocated in most cases, since it seemed to us that the largest source of androgens should be eliminated at once, but in many instances castration was not accomplished, for one reason or another, until a later date—perhaps a few months to several years after diagnosis. Transurethral resection was the method of choice for the relief of bladder-neck obstruction, but on a few occasions drainage by suprapubic cystostomy was required. An attempt was made to follow all patients with periodic examinations three to four times a year, so that adjustment of the dosage of estrogens might be made in accordance with the condition of the carcinoma and of the breasts. Our efforts in this direction have not been nearly as successful as we would have liked, since all too many of these patients tend to give up at the first worsening of their condition and fail to return.

While estrogens such as diethylstilbestrol, chlorotrianisene (TACE), and ethinyl estradiol (Estinyl) often exert a strong influence on prostatic carcinoma early in the course of treatment, our experience with the administration of larger doses in an effort to control reactivated prostatic carcinoma has been disappointing. As yet, we have had no experience with diethylstilbestrol diphosphate, but the report of Flocks and his colleagues [1] is moderately encouraging. They found that this substance, administered intravenously, was effective in some degree in some patients who failed to respond to the usual estrogen therapy. Evidence of objective improvement was meager, but subjective improvement occurred in a substantial number.

Bilateral adrenalectomy was done in seven of our patients whose prostatic carcinomas had become reactivated after a period of remission induced by castration and estrogen. In only one of these patients did the improvement seem to have definitely justified the procedure.[2] In this patient, there was no objective evidence of local regression of the prostatic carcinoma or of the osseous metastases; there was, however, a marked and dramatic clinical improvement, in that he rapidly became relieved of pain so severe that, prior to adrenalectomy, chordotomy had been considered as a last resort. This man, who had required assistance in getting around, was completely restored to normal physical activity, so that he could do such things as go fishing and could row his own boat a distance of 2 miles. He lived nearly two years while receiving a maintenance dose of cortisone, 37.5 mg. daily, and died, I believe from all accounts, in crisis from adrenal insufficiency induced by an intercurrent infection. There were two, and possibly three, other patients in this small group who showed slight subjective improvement of short duration. None lived longer than two years, and we have not done adrenalectomy for prostatic carcinoma now in more than two years.

Two patients who might have been candidates for bilateral adrenalectomy were treated instead with large doses of cortisone, after the plan suggested by Valk and Owens.[3] In neither patient was there subjective or objective improvement, and euphoria was conspicuous by its absence.

Included in this series are two patients who were admitted to the hospital because of extreme oliguria, which in each instance became anuria within two or three days. In neither case was bladder-neck obstruction more than moderate, although the diagnosis of prostatic carcinoma was obvious by palpation and confirmed by x-ray evidence of osseous metastasis or elevated serum acid phosphatase levels or both. In both of these patients, cystoscopy revealed evidence of nodular invasion of the lateral edges of the trigone; in one patient it was possible to get no. 4 catheter up one ureter, but in the other it was not possible to catheterize either ureter. In both of these patients, response to estrogen administered parenterally was so rapid that regression of the carcinoma occurred soon enough to release the ureters and permit a return of the kidney function to normal. After the patient's recovery from the azotemic state, castration was done in each instance; transurethral resection of the prostate was not required. In one of these patients the carcinoma became reactivated, and extensive osseous metastases developed and were accompanied by severe pain. Adrenalectomy was done two years after the orchiectomy, and the patient lived 11 months longer, but the lower ureters never became obstructed again.

Associate Professor of Urology, University of Louisville School of Medicine.

Read before the Section on Urology at the 105th Annual Meeting of the American Medical Association, Chicago, June 13, 1956.

Also in this group were two patients in whom extremely severe bleeding was associated with marked changes in the blood-clotting mechanism. It is believed that the bleeding in these cases must have been due to action of the prostatic proteolytic enzyme, and in each instance castration and institution of estrogen therapy were followed by a return to normal of prothrombin time and of clotting time and by control of bleeding. Irradiation of the pituitary was used in three patients who had been castrated and whose adrenals had been removed. There was no evidence of improvement in any of the three.

## Comment

*Incidence of Carcinoma of the Prostate.*—According to Moore,[4] about 20% of men past 50 years of age have histologically demonstrable carcinoma of the prostate. This figure is based on autopsy studies of large numbers of patients, most of whom died without clinical evidence of the disease. Since latent carcinoma of the prostate does exist to such a formidable degree, it might be expected to increase to some extent as a clinical disease as life expectancy increases, although this will not be as marked as the 18.6-year [5] increase in life expectancy that occurred between 1902 and 1953 would seem to indicate. Most of this gain results from lives saved during the first decade of life, and in 1953 the life expectancy of a person of 50 years was only 2.2 years greater than in 1902. For people 70 years of age, the gain has been only 1.3 years.

*Number of Carcinomas Found During Operations on Prostate Each Year*

| Year | Operations on Prostate, Total No. | Carcinomas Found | |
|---|---|---|---|
| | | Total No. | % |
| 1941 | 162 | 21 | 13.0 |
| 1942 | 171 | 27 | 15.7 |
| 1943 | 110 | 21 | 19.0 |
| 1944 | 127 | 22 | 17.3 |
| 1945 | 175 | 25 | 14.2 |
| 1946 | 255 | 24 | 9.4 |
| 1947 | 289 | 21 | 7.2 |
| 1948 | 375 | 40 | 10.6 |
| 1949 | 392 | 39 | 9.9 |
| 1950 | 443 | 53 | 11.9 |
| 1951 | 420 | 45 | 10.7 |
| 1952 | 437 | 61 | 13.9 |
| 1953 | 464 | 46 | 9.9 |
| 1954 | 466 | 69 | 14.8 |
| 1955 | 336 | 39 | 11.6 |
| Total | 4,622 | 553 | 11.9 |

While any increase in the life span above 50 years might be expected to result in a proportionate rise in the incidence of prostatic carcinoma due to the activation of latent carcinoma, a similar increase in the incidence of benign hypertrophy may offset any change in the ratio between the two conditions.

Some 30 years ago, the proportion of those patients requiring surgical intervention because of bladder-neck obstruction due to prostatic enlargement who proved to have carcinoma varied from 16 to 20%, according to various reporters. In my experience, this proportion varies without regularity from year to year, as shown in the table, and certainly reflects no increased incidence of carcinoma. Of a total of 4,622 prostates treated surgically during the past 15 years, 553, or 11.9%, proved to be affected with carcinoma, and there was no increase in the proportion during the later years. It is realized that too much significance cannot be attached to these figures except as they apply to our experience among the people of our own community.

*Grade of Carcinoma.*—Evaluation of any method used in treating carcinoma of the prostate must of necessity be influenced by the inclusion of low-grade, slowly progressing carcinomas whose hosts live 5 to 10 years even if nothing more is provided than relief from obstruction. On the other hand, a great many prostatic carcinomas exhibit evidence of rapid and even fulminating growth quite early, with osseous or lymphatic metastasis and often with invasion of surrounding structures. Unfortunately, it is not possible to foretell the future clinical course of any untreated patient with prostatic carcinoma by any known criterion such as grade of malignancy, x-ray evidence of metastasis, serum acid phosphatase level, or the urinary excretion of 17-ketosteroids, 17-hydroxycorticoids, and androgens. Such evidence is of value in measuring the response of the disease to therapy, however, and at times affords some basis for prognosis.

Mention has been made of the low-grade, slowly progressing carcinoma that produces obstruction but is slow to spread. However, I have seen some grade 1 tumors prove lethal in a matter of two or three years, and it is evident that the grading alone can not be depended upon to indicate that endocrine therapy is not needed because of slow development. Neither does a high grading mean that the prognosis is necessarily poor. Although I have never seen anyone with a high-grade prostatic carcinoma last very long if not treated, some of our patients with grade 3 or grade 4 tumors, perhaps with metastases and elevated serum acid phosphatase levels, have lived more than 10 years in apparent good health after bilateral orchiectomy. One patient, whose carcinoma was classed as grade 4 in November, 1941, had another resection in August, 1952, when the tissue removed was classed as grade 3, and is still alive and active in his profession today, 14½ years after beginning endocrine therapy.

It is, of course, easy to measure the effect of endocrine therapy in this latter group, where results obtained are often dramatic and are definitely attributable to therapy. When one of these patients lives 5 or 10 years after the institution of therapy, it is much more meaningful from a statistical standpoint than when one from the first group lives the same length of time.

*Withholding Therapy.*—While it has generally been our practice to start endocrine therapy, including bilateral orchiectomy, immediately after the diagnosis has been made, I am inclined to wonder if it might not be better to withhold endocrine therapy from those patients with low-grade carcinoma in whom there is no evidence of metastasis as long as the clinical course remains satisfactory and to start it as soon as the clinical course shows any considerable deterioration. After castration and institution of estrogen therapy, there is of course a tendency for the cancer cells to become adjusted to the altered hormonal environment and for the hormonal environment to readjust itself, so

that eventually a cancer in remission again becomes active. The use of this treatment sooner than it is needed might actually deprive some patients of a few extra years of life.

Following the same line of reasoning, I have found it difficult to understand the rationale of those who combine radical prostatectomy for early carcinoma with immediate orchiectomy and use of estrogen. Certainly, under such circumstances the results of the radical procedure would be impossible to evaluate, and it would seem better to hold the endocrine treatment in reserve for those patients in whom the radical operation has failed to completely eliminate the disease. It will be just as effective later, when its use might actually result in longer life for the patient.

Even more illogical is the practice of doing a radical prostatectomy after endocrine therapy has produced marked regression of an "inoperable" carcinoma. It is presumed that inoperability is due to obvious extension of the carcinoma beyond the confines of the prostate and seminal vesicles. No matter how marked the local regression resulting from castration and estrogen therapy, I do not believe that cancer cells already outside of the prostate and seminal vesicles return like sheep to the fold for the convenience of the surgeon.

*Adrenalectomy.*—Before ending, I should like to revert to a brief further consideration of adrenalectomy, the benefits of which, from the point of view of the surgeon, are so meager and of such short duration as to discourage any further use of it. To continue to use this procedure for the sake of the one patient out of six or seven who may be appreciably benefited is to assume a tremendous burden of discouragement and perhaps of criticism. That we have been so discouraged is attested by the fact that we have not used adrenalectomy for more than two years; yet I wonder if there may not be an occasional patient for whom this procedure would be worthwhile. In so saying I am, of course, remembering our one patient who did derive such marked benefit. Cortisone, while affording a measure of relief from pain to some, has been disappointing in our experience and has not been as effective as adrenalectomy in that respect.

I know of no convincing evidence that adrenalectomy adds any time to the life of the patient with prostatic carcinoma, and if it is used at all it should probably be reserved for an occasional patient suffering intense pain not relieved by administration of estrogen or cortisone or by other therapy. Certainly, the approach of the surgeon to this problem in each individual patient should be modified by an attitude of reluctance to perform unnecessary surgery and at the same time a willingness to undertake difficult things in behalf of the patient.

Hypophysectomy, as reported by Pearson and others,[6] may occasionally produce further remission in prostatic carcinoma after orchiectomy and adrenalectomy. However, it would not seem to have a wide applicability here even if it should provide, as Pearson suggests, a summation effect of castration, adrenalectomy, and hypophysectomy, in that order.

The research of Huggins;[7] of Pearson,[6] Harrison,[8] and Valk[9] and their respective co-workers; and of many others concerning endocrine physiology and its relations to prostatic and mammary cancer is tremendously interesting and truly deserves the close attention that it receives from their colleagues, such as myself, whose work is entirely clinical.

203 W. Second St. (6).

### References

1. Flocks, R. H.; Marberger, H.; Begley, B. J.; and Prendergast, L. J.: Prostatic Carcinoma: Treatment of Advanced Cases with Intravenous Diethylstilbestrol Diphosphate, J. Urol. **74:**549-551 (Oct.) 1955.

2. Ray, E. H.: Bilateral Adrenalectomy for Carcinoma of Prostate, Transactions of the Southeastern Section, American Urologic Association, 1954, pp. 107-115.

3. Valk, W. L., and Owens, R. H.: Effect of Cortisone on Patients with Carcinoma of Prostate, J. Urol. **71:**219-225 (Feb.) 1954.

4. Moore, R. A.: Textbook of Pathology: Pathological Anatomy in Relation to Causes, Pathogenesis, and Clinical Manifestations of Disease, ed. 2, Philadelphia, W. B. Saunders Company, 1951, p. 927.

5. Length of Life, Pfizer Spectrum **4:**280-281 (June 15) 1956.

6. Pearson, O. H., and others: Hypophysectomy in Treatment of Advanced Cancer, J. A. M. A. **161:**17-21 (May 5) 1956.

7. Huggins, C.: Endocrine Factors in Cancer, J. Urol. **68:**875-884 (Dec.) 1952.

8. Harrison, J. H.; Leman, C. B.; Munson, P. L.; and Laidlaw, J. C.: Androgen, Gonadotrophin and Steroid Excretion Before and After Castration and Adrenalectomy, J. Urol. **73:**580-584 (March) 1955.

9. Valk, W. L., and Ozar, M. B.: 17-Ketosteroid Excretion in Carcinoma of Prostate, J. Urol. **73:**591-598 (March) 1955.

---

**Inguinal Hernia in Infants.**—All inguinal hernias should be repaired as soon as the diagnosis is established. Unfortunately, there are still many who advise parents that operation should be delayed until the child reaches the age of 3 or 4 years. Admittedly, operation may be a little easier with the older child, but unfortunately . . . the majority of these little patients developed their hernias during the first two or three years of life, and its management becomes a real problem for the mother if surgery be delayed. There is practically no support for the idea that an established hernia in an infant will obliterate itself spontaneously. Conservative means using trusses of any known type have been extremely unsatisfactory . . . and it is very unusual to find a mother capable of maintaining constant reduction of a hernia by such means. Furthermore, these which do become complicated by incarceration occur almost entirely in this age group and demand immediate repair. Since the small infant tolerates a well-given anesthesia very well and the repair is entirely feasible in capable hands, we see no reason for withholding surgical correction from all cases regardless of age.—C. W. McLaughlin Jr., M.D., and C. Kleager, M.D., The Management of Inguinal Hernia in Infancy and Early Childhood, *A. M. A. Journal of Diseases of Children*, September, 1956.

# ADRENALECTOMY FOR METASTATIC BREAST CARCINOMA

Maurice Galante, M.D., Dudley J. Fournier, M.D.
and
David A. Wood, M.D., San Francisco

• *After oophorectomy the adrenal glands are the most significant remaining source of estrogens. Seventy-nine patients with advanced metastatic breast carcinoma underwent bilateral oophorectomy and adrenalectomy as a combination treatment-prophylaxis technique. There was no objective improvement in 38.7% of the patients and subjective improvement in 57.3%. Indications for this type of surgical management include objective demonstration of disseminated metastases. Jaundice from extensive liver metastases has been considered the only contraindication as far as location of the metastatic lesions are concerned.*

The management of metastatic breast carcinoma is a problem of palliation. As the disease becomes disseminated, a systemic approach is required, unless the lesions are relatively localized, such as may occur in the vertebrae or chest wall. It has been demonstrated that some types of breast carcinoma are highly sensitive to the hormonal environment in which they grow and propagate. This property has therefore been utilized in the palliative treatment of the disease.

Beatson's[1] observations that some breast cancers may regress after oophorectomy were brought to their logical conclusion by Huggins[2] when he removed the adrenal glands, which are the most significant remaining source of estrogen. This procedure has been carried out in 79 patients with advanced metastatic breast carcinoma in the advanced breast tumor clinic of the University of California Hospital (table 1). An evaluation of the results obtained to date will be reported.

## Indications

Bilateral adrenalectomy has not been utilized prophylactically. Objective demonstration of disseminated metastases prior to operation was made a prerequisite in this series. Solitary metastatic lesions amenable to surgical or radiation therapy were so treated. Because of the purely palliative nature of the procedure, the presence of symptoms necessitating relief is one of the foremost criteria. In patients who are symptom-free, objective demonstration of rapid progress of the lesions is a definite indication.

The response of a patient to adrenal ablation is usually unpredictable. However, the effect of prior hormone therapy is frequently of some help in the proper selection of cases. A favorable response to hormone therapy favors the possibility of a similar response to bilateral adrenalectomy.[3] In 18 patients, calcium-balance studies[4] failed to reveal any correlation between urinary calcium output under estrogen stimulation and the response of the patient to bilateral adrenalectomy.

All patients with primary lesions consisting of a well-differentiated adenocarcinoma showed a good response. However, a significant number of patients with undifferentiated lesions manifested equally good subjective and objective improvement. It is apparent that, although the presence of a well-differentiated carcinoma is an excellent prognostic criterion,[5] it is not an absolute requirement.

Extremes of age per se were not considered a contraindication to adrenalectomy unless other factors generally preventing major surgery were present. In this series, the ages ranged from 28 to 72 years, with an average of 48.7 years. Bilateral adrenalectomy and oophorectomy were performed as soon as possible without previous hormone therapy in young individuals with rapidly progressing metastatic carcinoma.

Adrenalectomy has been considered contraindicated in patients with jaundice from extensive liver metastases. Otherwise, the location of metastases has not affected the selection of patients for operation.

## Method

*Preoperative and Postoperative Management.*—The advent of hydrocortisone sodium succinate has simplified considerably adrenal replacement therapy, both preoperatively and postoperatively. The high solubility of the succinate with the consequent rapid absorption allows the surgeon to dispense with administration of the steroid prior to the operation. Hydrocortisone sodium succinate is given intramuscularly as the incision is made and at definite intervals during and after operation, as indicated in table 2. Alternate and less desirable methods with use of cortisone acetate given intramuscularly or hydrocortisone given intravenously have been described in previous publications.[6]

Desoxycorticosterone acetate is of help in stabilizing the patient's blood pressure and weight when the dosage of hydrocortisone is reduced. It is given in doses of 2 mg. on the third postoperative day. Thereafter, the dose is increased or decreased in amounts necessary to produce stabilization of blood pressure and weight. Its use is contraindicated in the presence of heart failure or edema.

Desoxycorticosterone trimethylacetate is given in doses of 25 mg. intramuscularly for each milligram of desoxycorticosterone required daily to maintain body weight. This usually corresponds to 1 ml. of the trimethylacetate every 21 to 30 days.

The maintenance dosage of cortisone acetate varied between 37.5 and 50 mg. per day, given in three or four divided doses.[6b] Unless the patient was under some type of stress, such as intercurrent infection,

From the Cancer Research Institute, the Department of Surgery, and the Metabolic Unit, University of California School of Medicine.

TABLE 1.—*Results of Bilateral Adrenalectomy and Oophorectomy**

| Patient | Age, Yr. | Menopausal Status | Time Since Mastectomy | Location of Metastases | Other Treatment | Survival Since Adrenalectomy | Objective Response | Subjective Response |
|---|---|---|---|---|---|---|---|---|
| 1 | 57 | 7 yr. postmenopausal | 15 yr. | Osseous, liver | Radiation; androgens; estrogens | 2 mo. (died) | Rapid progression of lesions | None |
| 2 | 46 | 13 yr. postmenopausal (surgical) | 2 yr., 8 mo. | Osseous, skin | Radiation | 24 mo. | None | Relief of pain |
| 3 | 42 | 1½ yr. postmenopausal (radiation) | † | Osseous, lymph nodes | Radiation; androgens | Died | None | None |
| 4 | 43 | Menopause caused by radiation treatment to spine 2 yr. prior | 2 yr. | Lymph nodes, osseous, pleural | Radiation; androgens | 12 mo. | Progression of osteolytic lesions | Relief of pain for 5 mo. |
| 5 | 40 | 3 yr. postmenopausal (surgical) | 7 yr. | Osseous | Radiation; estrogens; androgens | 22 mo. | None | Cessation of pain; ambulatory again |
| 6 | 51 | 6 yr. postmenopausal | 5½ yr. | Pulmonary lymph nodes, liver | Radiation; androgens | 4 mo. (died) | Increase in pleural lesions | None |
| 7 | 45 | 7 mo. postmenopausal (radiation) | 2 yr. | Osseous | Radiation | 21 mo. | Recalcification of osteolytic lesions | Cessation of pain |
| 8 | 55 | Postmenopausal | 11½ mo. | Adrenals, lymph nodes, bones | Radiation | 19 mo. | Recalcification of osteolytic lesions | Cessation of pain |
| 9 | 44 | Premenopausal | † | Pulmonary, osseous | Androgens | 1 mo. (died) | None | None |
| 10 | 60 | 10 yr. postmenopausal | 10 yr. | Pulmonary pleura, lymph nodes, rib, mass at base of sternum | ..... | 17 mo. | Cessation of pleural effusion | Cessation of pain |
| 11 | 46 | Surgical sterilization 15 mo. preoperatively | 6 yr. | Lymph nodes, skin | Androgens; radiation | 17 mo. | Swelling of arm reduced, better function | Loss of pain in arm |
| 12 | 67 | Postmenopausal | 6 yr. | Lymph nodes, skeletal | Estrogens; androgens | 13 mo. (died) | None | None |
| 13 | 28 | Premenopausal | 1 yr. | Pulmonary, skeletal | None | 15 mo. (died) | None | Relief of pain; improved walking |
| 14 | 36 | Premenopausal | 1 yr. | Lymph nodes, skin, skeletal | None | 14 mo. | None; disease progressed | None |
| 15 | 62 | 13 yr. postmenopausal | 6 yr. | Lymph nodes | Radiation; androgens | 16 mo. | Decrease in size of supraclavicular lymph nodes | Improved respiration |
| 16 | 44 | Premenopausal | 6 mo. | Skeletal, lymph nodes, pulmonary | Androgens; radiation | 13 mo. | Sclerosis of osteolytic lesions | Relief of pain |
| 17 | 46 | Irradiation sterilization 3 yr. prior | 3 yr. | Soft tissue, skin lymph nodes, pulmonary, skeletal | Radiation; androgens | 1 mo. (died) | None | None |
| 18 | 60 | 20 yr. postmenopausal | 10 yr. | Pleural, skin | None | Postoperative death | ..... | ..... |
| 19 | 39 | Amenorrhea 2 mo. since receiving androgens | 2½ yr. | Skin, pleura, soft tissue | Radiation; androgens | 14 mo. | Decrease in size of skin lesion | Improvement |
| 20 | 60 | 10 yr. postmenopausal | 1 yr. | Cerebral, skeletal, pulmonary | Radiation; androgens | (Died) | None | None |
| 21 | 43 | Premenopausal | 3 yr. | Skeletal | Radiation | (Died) | None | None |
| 22 | 41 | Premenopausal | 2½ yr. | Lymph nodes, skin | Radiation | (Died) | None | None |
| 23 | 45 | 2 yr. postmenopausal | 3 yr. | Pleura, skeletal | Radiation; estrogens | 1 mo. (died) | None | None |
| 24 | 29 | Premenopausal | 1 yr. | Skeletal, pleura | Radiation | 10 mo. | Pleural effusion ceased, osteolytic lesion calcified | Freedom from pain; improved respiration |
| 25 | 38 | Premenopausal | 7 yr. | Pulmonary, skeletal, lymph nodes | Radiation | 10 mo. | Pleural effusion ceased | Relief of pain |
| 26 | 46 | Irradiation of ovaries with menopause 1 yr. | 6 yr. | Pulmonary | Radiation; androgens | 5 mo. (died) | None | None |
| 27 | 38 | 1 mo. postmenopausal (surgical) | † | Clavicle and axilla, left | None | 9 mo. | Osteolytic lesion calcified, breast lesion disappeared | Pain disappeared |
| 28 | 49 | Premenopausal | 7 yr. | Skeletal | Radiation | 8 mo. | None | Relief of pain |
| 29 | 38 | Premenopausal | † | Skin, pulmonary | None | 17 days | None | None |
| 30 | 43 | Premenopausal | 6 mo. | Pulmonary | Androgens | 1 mo. | None | None |
| 31 | 45 | Premenopausal | 2 yr. | Pleura | Radiation; androgens | 6 mo. | Diminution of pleural fluid, decrease in size of lesions | Improvement |
| 32 | 60 | 5 yr. postmenopausal | 19 yr. | Skeletal | Estrogens | 6 mo. | Decrease in size of palpable skull nodules, improved vision | Relief of pain |
| 33 | 45 | Premenopausal | 1 yr. | Skeletal | Androgens | 6 mo. | Progression of disease | Relief of pain |
| 34 | 33 | Oophorectomy 1 yr. prior | 2 yr. | Osseous | Radiation; testosterone, meticorten | 6 mo. | None | Relief of pain |
| 35 | 42 | Premenopausal | 4 yr. | Skeletal, soft tissue | Radiation; androgens | 5 mo. | None | Relief of pain |
| 36 | 59 | 13 yr. postmenopausal (surgical) | 9 yr. | Pleural, skin | Radiation; estrogens; mustard; cortisone; androgens | 5 mo. | Improvement in skin lesions | Relief of pain |
| 37 | 59 | 10 yr. postmenopausal | 9 yr. | Lymph nodes, soft tissue, pulmonary, skeletal | Radiation; androgens | 4 mo. | Lesion disappeared | Relief of pain; improved respiration |

* 4 cases that are too recent for proper evaluation are not tabulated.

† Patient did not have mastectomy.

TABLE 1.—*Results of Bilateral Adrenalectomy and Oophorectomy* (Continued)*

| Patient | Age, Yr. | Menopausal Status | Time Since Mastectomy | Location of Metastases | Other Treatment | Survival Since Adrenalectomy | Objective Response | Subjective Response |
|---|---|---|---|---|---|---|---|---|
| 38 | 60 | 7 yr. post-menopausal | 4½ yr. | Pulmonary, skeletal | Radiation; androgens; cortisone; estrogens | 4 mo. | Progression of disease | Relief of pain |
| 39 | 54 | Pre-menopausal | † | Skin, lymph nodes | Radiation | 4 mo. | None | None |
| 40 | 60 | 10 yr. post-menopausal | † | Soft tissue, cranium, pulmonary | Sulfur mustard | 2 mo. (died) | None | None |
| 41 | 48 | 10 yr. post-menopausal | 9½ yr. | Pulmonary, osseous | Estrogens; androgens | 38 mo. (died) | Progression of lesions | Cessation of pain for 19 mo. |
| 42 | 40 | 5 mo. post-menopausal | 6 yr. | Osseous, pleural effusion | Radiation; androgens | 38 mo. (died) | Recalcification of osteolytic lesions | Cessation of pain; ambulatory; working |
| 43 | 67 | 10 yr. post-menopausal | 4 yr. | Chest wall ulcerations, lymph nodes | Radiation; androgens | 23 mo. (died) | Healing of ulcers | Cessation of pain |
| 44 | 43 | Pre-menopausal | 22 mo. | Soft tissue, pleural effusion | Radiation; androgens | Postoperative death | ..... | ..... |
| 45 | 57 | 8 yr. post-menopausal | 38 mo. | Pulmonary, pleural, osseous | None | 11 mo. (died) | None | None |
| 46 | 55 | 1 yr. post-menopausal (radiation) | 14 mo. | Lymph nodes, soft tissue | Ovarian ablation by radiation | 2 mo. (died) | None | None |
| 47 | 72 | 22 yr. post-menopausal | 2 yr. | Lymph nodes, soft tissue | Radiation | 7 mo. (died) | Progression of lesions | None |
| 48 | 37 | 5 yr. post-menopausal (surgical) | 10 mo. | Osseous, lymph nodes, soft tissue, adrenals | Radiation; androgens | 16 mo. (died) | Progression of lesions | Relief of symptoms |
| 49 | 57 | 5 yr. post-menopausal | 5¼ yr. | Osseous | Radiation; androgens | 3 mo. (died) | None | None |
| 50 | 41 | 1 mo. post-menopausal (surgical) | 3½ yr. | Osseous, lymph nodes, liver | Estrogens; androgens | 1 mo. (died) | None | None |
| 51 | 67 | Post-menopausal | † | Pulmonary, skin | Radiation | 36 mo. (died) | Epithelialization of ulceration | Disappearance of hemoptysis and cough |
| 52 | 33 | Pre-menopausal | 4 yr., 7 mo. | Lymph nodes, skin, contralateral breast | Radiation | 38 mo. | Regression of breast lesion; healing of ulcerations | Patient asymptomatic prior to adrenalectomy |
| 53 | 53 | 4 yr. post-menopausal | 4 yr., 7 mo. | Osseous | Radiation; androgens | 9 mo. (died) | None | None |
| 54 | 44 | 3 yr. post-menopausal | 3½ yr. | Adrenals, ovaries, osseous | Radiation to ovaries and bones; androgens | 10 mo. (died) | Progression of lesions | Cessation of pain |
| 55 | 60 | 18 yr. post-menopausal | 9 mo. | Pulmonary, pericardial | Estrogens; androgens | 16 mo. (died) | Progression of metastases | Cessation of pain |
| 56 | 50 | Menopause due to radiation after mastectomy | 4 yr. | Liver, lymph nodes | Androgens | 2 mo. (died) | Progression of metastases | None |
| 57 | 43 | 6 yr. post-menopausal (radiation) | 6 yr. | Osseous, lymph nodes, meninges, liver, pulmonary | Radiation | Postoperative death | ..... | ..... |
| 58 | 33 | Pre-menopausal | 7 mo. | Osseous, pulmonary | Radiation; androgens | (Died) | None | None |
| 59 | 43 | 4 yr. post-menopausal | 5 yr. | Lymph nodes, skeletal | Radiation; androgens | 7 mo. (died) | Recalcification of osteolytic lesions | Cessation of pain |
| 60 | 60 | 14 yr. post-menopausal | 7 yr. | Lymph nodes, osseous | Radiation; estrogens | 35 mo. | Recalcification of osteolytic lesions | Cessation of pain |
| 61 | 36 | 1½ yr. post-menopausal | 2 yr., 9 mo. | Osseous, pulmonary | Radiation; androgens | 2½ mo. (died) | Progression of lesions | None |
| 62 | 49 | 6 yr. post-menopausal (surgical) | 6½ yr. | Osseous | Radiation; androgens | 9 mo. (died) | None | None |
| 63 | 58 | Post-menopausal | 5 yr. | Skin, osseous, lymph nodes | Radiation; androgens | 33 mo. | Recalcification of osteolytic lesions | Cessation of pain |
| 64 | 42 | Pre-menopausal | 1 yr. | Liver, brain, ovaries, adrenals | Physiotherapy | 7 mo. (died) | Scotoma reduced | Cessation of pain |
| 65 | 57 | 6 yr. post-menopausal | 4 yr. | Osseous | Radiation; androgens | 24 mo. (died) | None | Questionable relief of pain |
| 66 | 49 | Pre-menopausal | 5 yr. | Osseous, ovaries, adrenals, colon, peritoneum | Radiation; androgens | 31 mo. | Recalcification of osteolytic lesions | Cessation of pain |
| 67 | 28 | 3 mo. post-menopausal (surgical) | 1 yr., 4 mo. | Lymph nodes, contralateral breast, skin | Radiation | Postoperative death | ..... | ..... |
| 68 | 56 | 8 yr. post-menopausal | 2 yr., 5 mo. | Chest wall, soft tissue | Radiation; estrogens | 5 mo. (died) | Progression of lesions | None |
| 69 | 62 | 19 yr. post-menopausal | 8 yr., 8 mo. | Osseous, lymph nodes | Radiation | 28 mo. | Increase in osseous metastases | Relief of pain |
| 70 | 35 | 3 mo. post-menopausal (radiation) | 2½ yr. | Skin, osseous, ovaries, adrenals | Radiation | 26 mo. | Regression of lesions; disappearance of ascites | Cessation of symptoms |
| 71 | 63 | 12 yr. post-menopausal | 6 yr. | Osseous, pulmonary | Radiation; estrogens; androgens | 6 mo. (died) | Progression of lesions | None |
| 72 | 53 | Menopause with androgens 3½ yr. prior | † | Contralateral breast | Radiation; androgens | 16 mo. (died) | Regression of chest-wall lesions | Patient asymptomatic prior to adrenalectomy |
| 73 | 54 | 12 yr. post-menopausal (radiation) | 12 yr. | Osseous, lymph nodes | Radiation; ablation of ovaries; androgens | 25 mo. | Regression of scalp masses | Cessation of pain |
| 74 | 40 | 6 mo. post-menopausal | 4 yr. | Lymph nodes, liver, skin | Radiation; androgens | 25 mo. | Diminution in size of liver and axillary nodes | Patient asymptomatic prior to adrenalectomy |
| 75 | 69 | 28 yr. post-menopausal | 1½ yr. | Pulmonary lymph nodes, soft tissue | Radiation | 24 mo. | Progression of metastases | None |

* 4 cases that are too recent for proper evaluation are not tabulated.

† Patient did not have mastectomy.

trauma, extreme climatic change, psychic shock, or surgery, the aforementioned maintenance doses proved satisfactory in all cases.

The use of fluids intravenously, vasopressor agents, antibiotics, and anesthetic and analgesic agents was subject to the same indications and contraindications that are followed in other major surgical procedures.

TABLE 2.—*Steroid Replacement Therapy*

Day of Operation
- Hydrocortisone sodium succinate
  100 mg. I.M. at time of incision
  50 mg. I.M. 4 hr. after initial dose
  50 mg. I.M. every 6 hr. thereafter

1st Postoperatve Day
- Hydrocortisone sodium succinate
  50 mg. I.M. every 8 hr.

2nd Postoperative Day
- Hydrocortisone sodium succinate
  25 mg. I.M. every 6 hr.

or
- Cortisone acetate
  25 mg. orally every 6 hr.

3rd Postoperative Day
- Cortisone acetate
  25 mg. orally every 8 hr.
- Desoxycorticosterone acetate
  2 mg. I.M. if no edema or heart failure
  Daily weight*

4th Postoperative Day
- Cortisone acetate
  12.5 mg. orally every 6 hr.
- Desoxycorticosterone acetate
  2 mg. I.M.

5th Postoperative Day
- Cortisone acetate
  12.5 mg. every 8 hr. orally

6th Through 10th Postoperative Days
- Long-acting desoxycorticosterone trimethylacetate*

* Desoxycorticosterone trimethylacetate given in doses of 25 mg. I.M. for each milligram of desoxycorticosterone required daily to maintain body weight.

Prior to discharge from the hospital, the patient was indoctrinated concerning the problems that may arise following removal of both adrenal glands. She was given instructions regarding the cortisone replacement therapy as well as the sodium chloride requirements. She was also given several copies of a card to be carried personally at all times, outlining her maintenance therapy and suggesting emergency measures (table 3).

TABLE 3.—*Copy of Card Carried at All Times by Patient After Adrenalectomy*

IN CASE OF EMERGENCY

I, the undersigned, have had a complete bilateral adrenalectomy. If I am found unconscious or severely injured give at once 100 mg. I-M of hydrocortisone sodium hemisuccinate and 50 mg. I-M q4h thereafter. If the above is unavailable give 100 mg. I-M cortisone acetate and 25 mg. every hour I-M or orally thereafter. Notify my doctors as soon as possible for further instructions:

..... ..... .....
Family Physician Address Phone

..... ..... .....
Surgeon Address Phone

My daily maintenance under normal conditions is ..... mg. of cortisone acetate orally every ..... hours and a long-acting preparation of desoxycorticosterone monthly equivalent to 1 mg. of desoxycorticosterone acetate daily.

Signed .....
Address .....
City .....
Phone .....

*Operative Technique.*—The transabdominal transperitoneal or the standard flank approach was used for removal of the adrenal glands. The flank approach is preferable in patients who have already undergone bilateral oophorectomy. It usually offers an easier access to the adrenal glands bilaterally. However, it requires three separate incisions and turning of the patient for positioning when the ovaries are present. This approach is contraindicated in patients in whom extensive metastases to the spinal column would predispose to collapse of the vertebrae. An upper transverse curved incision or a midline incision was utilized for the transabdominal approach.

TABLE 4.—*Results in Seventy-nine Cases of Bilateral Adrenalectomy and Oophorectomy for Mammary Carcinoma**

| Result | Patients No. | Patients % |
|---|---|---|
| Patients operated on | 79 | 100.0 |
| Postoperative deaths | 4 | 5.0 |
| Died subsequently | 40 | 50.6 |
| Improved objectively | 29 | 38.7† |
| Improved subjectively | 43 | 57.3† |
| Failed to respond | 32 | 42.7† |

* November, 1952, to May, 1955.
† Calculated on basis of 75 patients, 4 patients having been operated on too recently for proper evaluation.

TABLE 5.—*Response of Patient According to Age Distribution*

| Age Group, Yr. | Patients, Total No. | Objective Improvement No. | Objective Improvement % | Subjective Improvement No. | Subjective Improvement % |
|---|---|---|---|---|---|
| Under 30 | 3 | 1 | 33 | 2 | 67 |
| 30-39 | 11 | 5 | 45 | 7 | 64 |
| 40-49 | 29 | 10 | 34 | 17 | 59 |
| 50-59 | 16 | 6 | 38 | 7 | 44 |
| 60-69 | 15 | 6 | 40 | 9 | 60 |
| 70 and over | 1 | 0 | 0 | 0 | 0 |

Occasionally, exposure of the adrenal glands may be unusually difficult with the transperitoneal approach. The fact is to be emphasized that, regardless of the approach used, proper hemostasis is of the utmost importance. The main adrenal veins are secured with ligatures after transection. The numerous adrenal arterioles entering the gland at its periphery may be secured by the use of McKenzie brain clips.

TABLE 6.—*Response of Patient According to Time Since Mastectomy*

| Yr. Between Mastectomy and Adrenalectomy | Patients, Total No. | Objective Improvement No. | Objective Improvement % | Subjective Improvement No. | Subjective Improvement % | No Response No. | No Response % |
|---|---|---|---|---|---|---|---|
| No mastectomy | 8 | 3 | 37.5 | 3 | 37.5 | 5 | 62.5 |
| Less than 1 yr. | 6 | 2 | 33.3 | 4 | 66.7 | 2 | 33.3 |
| [illegible] | [illegible] | 7 | [illegible] | 11 | 52.4 | 10 | 47.6 |
| 3 to 5 yr. | 14 | 3 | 21.4 | 7 | 50.0 | 7 | 50.0 |
| 5 to 10 yr. | 21 | 10 | 47.6 | 14 | 66.7 | 7 | 33.3 |
| Over 10 yr. | 5 | 3 | 60.0 | 3 | 60.0 | 2 | 40.0 |

TABLE 7.—*Response of Patient According to Menopausal Status*

| Status | Patients, Total No. | Objective Improvement No. | Objective Improvement % | Subjective Improvement No. | Subjective Improvement % |
|---|---|---|---|---|---|
| Premenopausal | 20 | 8 | 40.0 | 11 | 55.0 |
| Postmenopausal | 55 | 20 | 36.4 | 32 | 58.4 |

## Results

Seventy-nine patients underwent bilateral oophorectomy and adrenalectomy for advanced metastatic breast carcinoma (table 4). Four patients died as a result of operation, a mortality rate of 5%. One patient (case 44) died of respiratory obstruction shortly after

leaving the recovery room. The second patient (case 57) died of shock in so-called hepatorenal syndrome that did not respond to intensive steroid replacement therapy and other measures. This patient had marked jaundice preoperatively and had extensive liver metastases. The third patient (case 67) died on the second postoperative day because of unrecognized acute adrenal insufficiency. Persistent vomiting insidiously deprived this patient of the required steroids, which were being administered orally in adequate doses. The fourth patient (case 18) died as a result of an acute massive pulmonary embolus.

Forty patients have died up to the time of writing, at periods varying from 1 to 37 months after adrenalectomy. Thirty-five patients are alive at the time of this report. The mean survival time after adrenalectomy is 12.6 months. The longest survival to date is 38 months, in a patient who was 33 years old at the time of adrenalectomy. This patient obtained objective and subjective improvement for 37 months and is now experiencing an exacerbation of the disease.

The number of patients in categories of age (table 5) and time since mastectomy (table 6) is too small to be statistically significant. The results suggest that age of patients and interval since mastectomy do not influence the response to adrenalectomy.

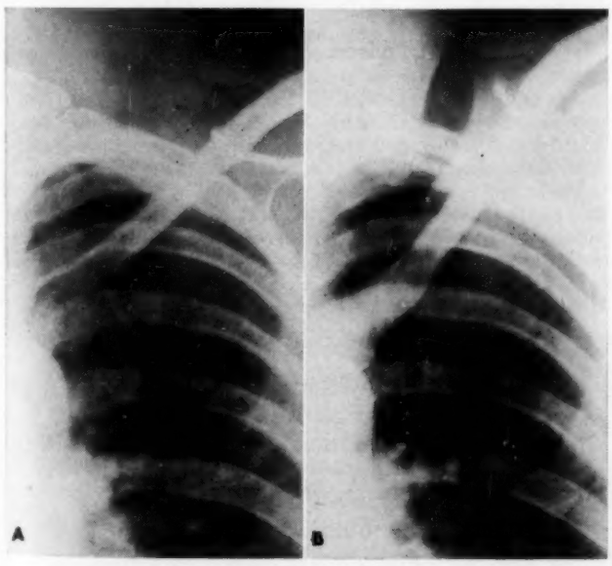

Fig. 1 (case 27).—*A*, roentgenogram showing osteolytic lesion in the head of the left clavicle in a 38-year-old pregnant woman with unoperated cancer of the left breast. *B*, roentgenogram taken three months after bilateral adrenalectomy and oophorectomy showing sclerosis of lesion.

In this series, no significant difference was noted in objective and subjective response between premenopausal and postmenopausal patients (table 7). Of 13 patients who had surgical oophorectomy prior to relapse, 5 (38.5%) showed objective improvement and 8 (61.5%) showed subjective improvement after adrenalectomy. Objective improvement (table 4) occurred in 29 patients (38.7%). (Four patients were operated on too recently to be evaluated properly.) This improvement consisted of sclerosis of osteolytic lesions (fig. 1), healing of ulcerations (fig. 2), diminution in the size of masses (fig. 3), and disappearance of pleural effusions (fig. 4). Only one patient with extensive liver metastases showed objective improvement, in the form of marked regression of the hepatic lesions. This patient survived 23 months.

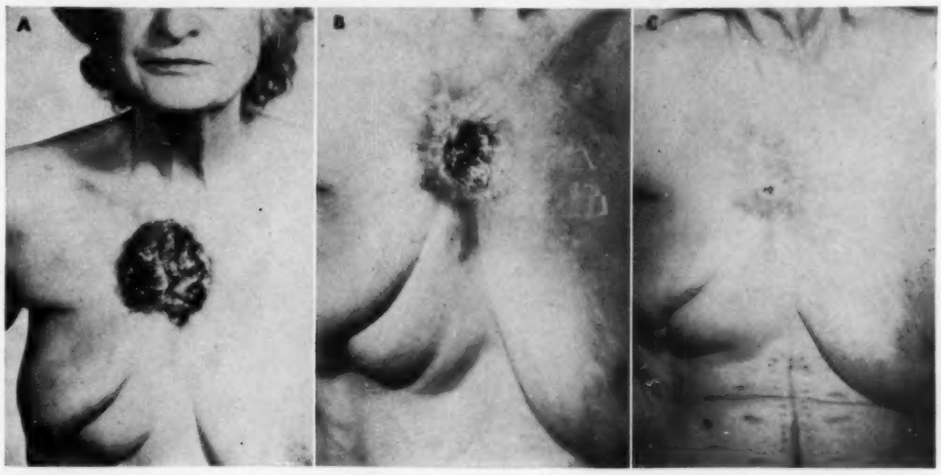

Fig. 2 (case 51).—*A*, photograph showing presternal metastases in 67-year-old female with unoperated carcinoma of the right breast. *B*, marked improvement following radiation therapy; however, healing had ceased for five months and biopsy revealed presence of carcinoma. *C*, epithelization three weeks after bilateral adrenalectomy and oophorectomy.

TABLE 8.—*Response of Lesions According to Location**

| Location of Metastases | Patients, Total No. | Objective Improvement | | Subjective Improvement | |
|---|---|---|---|---|---|
| | | No. | % | No. | % |
| Skeletal | 49 | 11 | 23 | 30 | 61 |
| Soft tissues | 39 | 8 | 21 | 18 | 46 |
| Cutaneous | 14 | 8 | 57 | 5 | 36 |
| Pulmonary | 31 | 4 | 13 | 9 | 29 |

* Multiple sites of metastases tabulated individually.

In a 38-year-old patient (case 27) with a large unoperated carcinoma en cuirasse involving the entire left breast, a four-month pregnancy was interrupted prior to adrenalectomy. Rapid sclerosis of osteolytic lesions (fig. 1), complete disappearance of the mass in the breast and axillary lymph nodes to palpation, and cessation of pain continue at the time of writing, nine months after operation.

Subjective improvement (table 4) occurred in 43 patients (57.3%). The most dramatic manifestation of subjective improvement was cessation of pain. This was usually complete and occurred within the first 24 to 48 hours. Increase in appetite, improved breathing, improved gait, cessation of hemoptysis, and improvement of visual fields in patients with cerebral metastases were other indications of subjective improvement. Not all of this improvement could be attributed to the physiological doses of steroids used in the replacement therapy. Paradoxically, subjective improvement was noted in 14 patients (18.7%) concurrently with objective evidence of progression of all lesions.

## Summary

Bilateral adrenalectomy and oophorectomy were performed in 79 patients with advanced metastatic breast carcinoma. The operative mortality was 5%. Objective improvement occurred in 38.7% of patients. Subjective improvement occurred in 57.3% of patients. In 42.7%, there was no response to adrenalectomy.


Third and Parnassus Avenues (22) (Dr. Galante).

Part of this work was carried out under a grant from the National Cancer Institute, U. S. Public Health Service, and the American Cancer Society, Inc.

The corticotropin used in this study was supplied by the Armour Laboratories, Kankakee, Ill., and the Wilson Laboratories, Chicago; the cortisone and hydrocortisone were supplied by Merck and Co., Inc., Rahway, N. J.; the hydrocortisone sodium succinate was supplied by the Upjohn Company, Kalamazoo, Mich.; and the desoxycorticosterone trimethylacetate was supplied by Ciba Pharmaceutical Products, Inc., Summit, N. J.

Professors H. Glenn Bell and Horace J. McCorkle made patients available for this study.

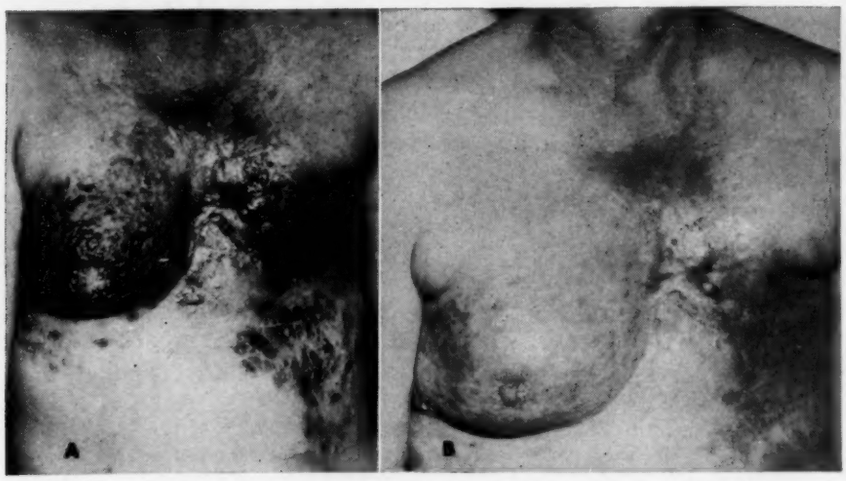

Fig. 3 (case 72).—*A*, appearance of bilaterally involved breasts in 53-year-old patient prior to adrenalectomy. *B*, same patient after adrenalectomy, showing marked improvement that lasted 16 months.

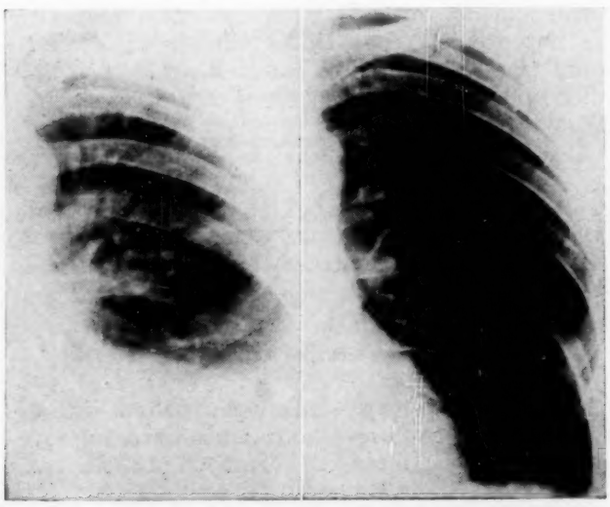

Fig. 4 (case 59).—Roentgenograms showing sclerosis of osteolytic rib lesions and disappearance of pleural effusion in 43-year-old woman after bilateral adrenalectomy and oophorectomy.

## References


1. Beatson, G. T.: On Treatment of Inoperable Cases of Carcinoma of Mamma: Suggestions for New Method of Treatment with Illustrative Cases, Lancet **2**:104, 1896.

2. Huggins, C., and Bergenstal, D. M.: Effect of Bilateral Adrenalectomy on Certain Human Tumors, Proc. Nat. Acad. Sc. **38**:73-76 (Jan.) 1952; Inhibition of Human Mammary and Prostatic Cancers by Adrenalectomy, Cancer Res. **12**:134-141 (Feb.) 1952. Huggins, C., and Dao, T. L. Y.: Adrenalectomy for Mammary Cancer, Ann. Surg. **136**:595-603 (Oct.) 1952.

3. (*a*) Galante, M., and others: Bilateral Adrenalectomy for Advanced Carcinoma of Breast with Preliminary Observations on Effect of Liver on Metabolism of Adrenal Cortical Steroids, Ann. Surg. **140**:502-514 (Oct.) 1954. (*b*) Galante, M., and McCorkle, H. J.: Clinical Evaluation of Bilateral Adrenalectomy and Oophorectomy for Advanced Mammary Carcinoma, Am. J. Surg. **90**:180-188 (Aug.) 1955. (*c*) Pearson, O. H., and others: Management of Metastatic Mammary Cancer, J. A. M. A. **159**:1701-1704 (Dec. 31) 1955.

4. Pearson, O. H.; West, C. D.; Hollander, V. P.; and Treves, N. E.: Evaluation of Endocrine Therapy for Advanced Breast Cancer, J. A. M. A. **154**:234-239 (Jan. 16) 1954.

5. Huggins, C., and Dao, T. L. Y.: Characteristics of Adrenal-Dependent Mammary Cancers, Ann. Surg. **140**:497-501 (Oct.) 1954; Adrenalectomy and Oophorectomy in Treatment of Advanced Carcinoma of Breast, J. A. M. A. **151**:1388-1394 (April 18) 1953.

6. (*a*) Footnote 3*a* and *b*. (*b*) Galante, M.; Rukes, M.; Forsham, P. H.; and Bell, H. G.: Use of Corticotropin, Cortisone and Hydrocortisone in General Surgery, S. Clin. North America **34**:1201-1218 (Oct.) 1954.


---

**Leukemia, Lymphosarcoma, and Hodgkin's Disease.**—In all . . . subdivisions of malignant lymphoma, mixed cell types are seen—[from] reticuloendothelial cells in giant follicular lymphoma to lymphocytes in reticulum cell sarcoma. But the stage in maturation at which arrest has occurred, the percentage of intermitotics which has undergone arrest, and the rate of proliferation at the arrested stage will determine the histologic appearance, degree of differentiation, and in large part, the clinical course. . . . It would appear that much of the confusion relevant to tumors of lymphoid tissue is, as is the case in many disease states, largely the result of man-made superstructures of complicated classifications and nomenclature. The lack of dissemination and/or application of basic biologic principles has contributed heavily to the many misconceptions that have pervaded the subject of the malignant lymphomas. The unitarian concept. . . although confronted by the charge of oversimplification by some, seems justified by the facts as we now know them.—J. R. Carter, Some Basic Concepts Regarding Tumors of Lymphoid Tissue, *The American Journal of Roentgenology, Radium Therapy and Nuclear Medicine*, November, 1956.

# ELECTROSHOCK THERAPY DURING THE PUERPERIUM

David J. Impastato, M.D.
and
Anthony R. Gabriel, M.D., New York

• *Any patient in the puerperium who is acutely disturbed, unmanageable, suicidal, or homicidal is a proper subject for electroshock therapy. For affective disorders, electroshock therapy alone is the treatment of choice. If a patient is suffering from a schizophrenic reaction, a combination of electroshock and insulin therapy may be indicated. Fourteen women were treated with electroshock therapy during the puerperium without a single complication being encountered, but, when this type of therapy is considered, the possibility of dislodging an embolus by the electroconvulsion must always be kept in mind. Where there is evidence of postpartum thrombophlebitis, it is best to defer therapy during the six weeks of the puerperium, provided the psychosis does not in itself threaten the patient's life.*

This will primarily be a discussion of the applicability of electroshock therapy in the postpartum psychoses during the puerperium and of the psychiatric management of patients requiring such treatment. We will also touch on the nature and treatment of these psychoses, as well as the relations to electroshock therapy of some of the physical complications present during the puerperium. The puerperium is usually described as the period beginning immediately after delivery and ending when all the organs of reproduction have returned to normal in six to eight weeks or longer. For our purposes, we have restricted the puerperium to the first six weeks post partum.

## Postpartum Psychoses

Among the psychiatric syndromes found in postpartum psychoses are toxic-exhaustive states, manic-depressive reactions, and schizophrenic or schizoaffective reactions. In the literature, considerable controversy exists as to what constitutes a postpartum psychosis. Many authorities, such as Hill and Keedy,[1] Chapman,[2] Jacobs,[3] Laboucarié,[4] and Harris,[5] contend that there is no such entity and that, in cases in which a parturient woman becomes psychotic, parturition and the postpartum period act merely as precipitating causes of a preexistent mental illness. Bos[6] feels that perhaps the only true postpartum psychosis is the one characterized by the toxic-exhaustive syndrome; this occurs after prolonged and exhausting labor. Hemphill[7] describes a puerperal depression that differs from manic-depressive psychoses and resembles involutional melancholia.

> The personality . . . is rigid and restricted in contrast to that of manic-depressive cases. This illness, like puerperal schizophrenia, makes its appearance within the first fortnight after delivery, sometimes in the first week. . . . Ideas of guilt and unworthiness are prominent, often with an abnormal attitude to bodily functions. There may be loss of interest in or rejection of the child, or fear—sometimes realized—that it may be harmed. Motor agitation is prominent. . . . The condition is extremely intractable even when treated by convulsion therapy and, if untreated may persist for a year or more after confinement. Eventual recovery or spontaneous remission is usual.

Hemphill also states that puerperal schizophrenia differs from other schizophrenia in that, in spite of the early treatment that is made possible because of the acuteness of the onset of the condition and its appearance in the first few days after confinement, the response to treatment is uniformly bad. This contrasts with the 60 to 70% favorable response to electroshock treatment in patients with acute nonpuerperal schizophrenia.

From the Department of Psychiatry, New York University–Bellevue Medical Center.

Read before the Section on Nervous and Mental Diseases at the 105th Annual Meeting of the American Medical Association, Chicago, June 12, 1956.

Hegarty[8] describes a postpuerperal recurrent depression. Bower and Altschule[9] state that postpartum psychotic depression is characterized by a course of chronic relapsing. On the premise that women with puerperal psychoses have a hyperfunctioning adrenal cortex, they have treated these patients with large doses of progesterone, with the intent of inhibiting the function of the adrenal cortex. They claim that, whereas their patients formerly responded to electroshock therapy but then quickly relapsed, with the combining of shock therapy with progesterone therapy, many patients no longer relapse. Abély[10] and Balduzzi,[11] of the French school of psychiatry, feel that perhaps in patients suffering from postpartum psychoses there is a malfunctioning of the hypophysial-hypothalamic region, with disordered function of the autonomic and endocrine systems. Delay and co-workers[12] found histological changes in the endometrium of women suffering from postpartum psychoses and state that the mental condition returns to normal only after the histology of the endometrium has returned to normal and menstruation is fully reestablished. They feel that both the mental disorder and the menstrual change are due to a central primary disorder of the hypophysial-diencephalic region.

It appears that puerperal psychoses may be divided into two distinct groups: One group consists of the same type of psychoses found in women in general, the condition becoming manifest during the postpartum period only incidentally. The other group consists of psychoses directly related to parturition and the puerperium. As mentioned before, the psychoses in this latter group may be classified as toxic-exhaustive states, relapsing depressions, and schizophrenic or schizoaffective reactions with acute onset.

The prognosis of the toxic-exhaustive and manic-depressive forms seems to be generally good. Hemphill[7] reports that 65 out of 66 patients in the manic-depressive and puerperal depression groups recovered. The other patient committed suicide. Kino and Thorpe[13] stated that 93% of patients with the manic-depressive type of psychosis recover. It must not be overlooked that some of these patients relapse soon after treatment has stopped. However, they eventually recover. The psychiatric outlook is excellent for patients in the toxic-exhaustive state who survive the physical effects of the illness. Hemphill[7] reported on 14 of these patients, 10 of whom recovered and 4 of whom died. There is some divergence of opinion regarding the outlook for the schizophrenic group. Most observers, such as Hemphill,[7] report uniformly poor results, with a recovery rate ranging from 5 to 30%. Hill and Keedy,[1] on the other hand, reported success in 13 out of 13 schizophrenics. Von Hagen[14] also reported favorable results in schizophrenic patients treated with electroshock and insulin therapy. Perhaps with more intensive treatment, especially the combination of electroshock and insulin therapy, the rate of recovery for those in the schizophrenic-reaction group may be improved.

## Types of Treatment

In order to prevent, if possible, the development of a postpartum psychosis, the patient should be psychologically prepared during pregnancy for parturition, the puerperium, and motherhood. Infection and exhaustion during labor should be guarded against. If there is infection, it should be treated with antibiotics and sulfonamides. If the diagnosis warrants it, shock treatment, which may consist of insulin, electroshock, or pentylenetetrazol convulsive therapy, may be given. The convulsive therapy may be given either on an inpatient or an outpatient basis. Hormonal therapy may be used. As shown by Bower and Altschule,[9] progesterone may be administered. Kraines[15] points out that testosterone may be used. Also, anterior pituitary extract or, as Jacobs[3] notes, adrenal cortical extract may be used in hormonal therapy. According to Jacobs,[3] vitamin therapy with yeast, ascorbic acid, nicotinic acid, and adexolin (vitamins A and D) is particularly indicated for those patients in toxic-exhaustive states.

Psychotherapy alone or in conjunction with other types of treatment may be used. Tranquilizing drugs and sedatives are also of value. However, in this paper we shall concern ourselves only with electroshock therapy.

TABLE 1.—*Duration, Frequency, and Results of Electroshock Treatments Given, During the Puerperium, in Fifty-Seven Cases from the Literature*

| Observer | Case No. | Postpartum Day Treatment Began | Postpartum Day Treatment Ended | Treatments in Six-Wk. Postpartum Period, No. | Complications | Comments |
|---|---|---|---|---|---|---|
| Block | 1 | 5 | 63 | 11 | None | |
| Bower and Altschule | 2 | 32 | 46 | ? | Relapse | Relapsed; received additional 29 E.S.T., insulin, and progesterone; recovered |
| Boyd and Brown | 3 | 10 | ? | 14 | None | Child premature; also received E.S.T. before delivery |
| | 4 | 22 | 37 | 6 | None | |
| | 5 | 24 | 35 | 7 | Fever | Curare used; patient had temperature of 102-103 F (38.8-39.4 C) |
| Chapman | 6-8 | ? | ? | ? | | These 3 with known thrombophlebitis treated without complications; of 40 others, 4 had psychoses after therapeutic abortion |
| Brew and Seidenberg | 9-19 | After 4th wk. | ? | ? | None | |
| Feldman and co-workers | 20-33 | Before 4th wk. | ? | ? | None | 5 received insulin |
| Hill and Keedy | 34-43 | 8 patients before 6th wk.; 2 patients before 2nd wk. | ? | ? | None | |
| Jacobs | 44 | After 4th wk. | ? | 2 courses | None | |
| | 45 | After 4th wk. | 9th wk. | | None | |
| Kino and Thorpe | 46 | 11 | 22 | 7 | Died | Died from embolus 6 days after last E.S.T. |
| Lipton | 47 | 2 | 4 | 2 | Relapse | Received 6 E.S.T. during 6th mo. of pregnancy; relapsed 2 days post partum |
| McNair | 48 | 10 | ? | 20 in 2 courses | None | Also 62 insulin-induced comas |
| | 49 | 20 | ? | 20 in 3 courses | None | Also 65 insulin-induced comas |
| Wayne | 50 | 4th or 5th wk. | ? | ? | | |
| Houck | 51 | 26 | 81 | 9 | None | Received 17 E.S.T. in all |
| | 52 | 32 | 44 | 6 | None | |
| | 53 | 22 | 42 | 10 | | |
| | 54 | 17 | 70 | 10 | None | Received 21 E.S.T. in all |
| | 55 | 17 | 40 | 10 | None | |
| | 56 | 30 | ? | ? | None | |
| | 57 | 16 | 122 | 10 | | Received 35 E.S.T. in all |

## Review of Literature

There is no doubt in our minds that, since the introduction of electroshock therapy in 1938, thousands of women in the puerperium have been treated with it. However, relatively few of the cases have been reported, and we have not found a single article dealing exclusively with the use of electroshock therapy during the puerperium. From the literature and other sources, we have assembled data on 57 patients who were given such therapy during the puerperium. Eight began treatment before the end of the sixth week; 17, before the fifth week; 18, before the fourth week; 4, before the third week; 5, before the second week; and 2 during the first week. Three patients suffering from known thrombophlebitis were treated by Chapman[2]; she made no mention as to the time during the puer-

perium that they were treated. She also reported on the cases of four patients who developed psychoses after induced abortions. Williams and Barrera[16] have treated patients in the puerperium, without complications, as early as 48 hours after delivery. No complications occurred in the 57 cases except in two instances, described below. Kine and Thorpe[13] made the following report:

A 38-year-old patient had puerperal manic reaction; she was admitted to the hospital 11 days after parturition. There were no clinical evidences of infection, and the patient's mental state was so acute that it was decided to try the effect of electroshock therapy. Over a period of 11 days, convulsion was induced on seven different occasions, with benefit; but, six days after the last convulsion, the patient was found to have blood-stained sputum and mild pyrexia. Examination of the blood showed anemia, with a normal leukocyte count; but on culture hemolytic streptococci were found. She died six days later, on the 36th day after childbirth, despite administration of sulfonamides. The autopsy revealed a small infarct of the lung, pelvic venous thrombosis, and evidence of low-grade puerperal infection. In this case, one cannot exclude the possibility of the electroshock therapy having mobilized thrombi in the pelvic veins, although the patient had been actively maniacal at times.

This patient died from pulmonary infarcts arising from pelvic emboli. If the emboli had been discharged at the time of the last convulsive treatment, the blood-stained sputum and the pyrexia should have occurred on the same day as the treatment or, at the latest, on the following day. The fact that the blood-stained sputum occurred on the sixth day after the last treatment makes it very unlikely that the convulsive treatment had any causal relation to it. Inasmuch as the patient was acutely maniacal, it is very possible that her overactivity dislodged from the existing pelvic thromboses the emboli that resulted in her death. It is reasonable to suppose that, if the patient had been treated with electroshock therapy more vigorously, that is, daily or more frequently, so as to control her overactivity, the dislodged emboli and her subsequent death might possibly have been avoided.

The other case in which complications occurred was reported by Feldman and co-workers.[17]

A 33-year-old woman was admitted to a hospital one month after delivery of her first child. Shortly after delivery she had become depressed and apathetic and had expressed the feeling that members of her family would be glad if she died. She was given three electroshock treatments, all resulting in grand mal convulsions; then she was discharged to a nursing home, somewhat improved. There she developed phlebitis of the left leg, which was not markedly troublesome. About two months after delivery, her depression had again deepened, and she was returned to the hospital. At that time, physical and neurological examinations were negative, except for mild tenderness and swelling over the inner and anterior aspects of the left thigh. Two days after this admission, the patient was given her fourth electroshock treatment. A typical grand mal convulsion resulted, but the patient remained apathetic and lethargic after it. She was incontinent and was unable to respond intelligibly to questions. No pathological neurological signs developed, but about eight hours after electroshock therapy, the patient died. Permission to perform an autopsy was not obtained.

Since an autopsy was not performed, the authors' statement that, in their opinion, the patient died from an embolus is only a supposition. This patient apparently had nonsupportive thrombophlebitis, a condition that rarely gives rise to emboli. She did not die suddenly, as she would have from an embolus of the pulmonary artery. There were no focal neurological signs; however, we must remember that a lesion in the hypothalamic region could cause the apathetic state the patient manifested. If it is assumed that the patient had no focal lesions, then it is unlikely that the cause of death was due to emboli. We must agree with the authors' statement that the cause of death in this patient cannot be determined absolutely.

## Report of Cases

We have treated 14 women with electroshock therapy during the puerperium without encountering a single complication. In one patient, treatment was begun during the fourth week after delivery; in six patients, during the third week; in six patients, during the second week; and in one patient, during the first week. Table 2 shows the results of electroshock therapy in these patients, as well as the number and duration of treatments. Seven of the 14 patients received insufficient treatment because they were certified to state hospitals before treatment had been completed. One of these patients received eight additional treatments at a state hospital and improved sufficiently to be released. Seven patients received from 10 to 20 treatments; this was considered adequate. Of these patients, two improved and five did not improve. Treatment was usually given daily or five times weekly to disturbed patients and twice weekly to less disturbed patients. The Reiter amplitude-modulated unidirectional current machine was used to bring on the convulsions. Our method of administering electroshock therapy during the puerperium is illustrated in the two case reports that follow.

TABLE 2.—*Duration, Frequency, and Results of Electroshock Treatments Given to Fourteen Patients During the Puerperium*[*]

| Case No. | Postpartum Day Treatment Began | Postpartum Day Treatment Ended | Treatments in Six-Wk. Postpartum Period, No. | Comments |
|---|---|---|---|---|
| 1 | 15 | 18 | 5 | Certified† |
| 2 | 25 | 26 | 3 | Certified |
| 3 | 15 | 32 | 10 | Certified |
| 4 | 20 | 41 | 11 | Went home, improved |
| 5 | 11 | 29 | 20 | Certified |
| 6 | 20 | 28 | 11 | Certified |
| 7 | 10 | 16 | 4 | Certified |
| 8 | 15 | 18 | 2 | Certified |
| 9 | 20 | 20 | 2 | Certified |
| 10 | 11 | 16 | 6 | Went to nursing home |
| 11 | 11 | 70 | 18 | Outpatient, improved |
| 12 | 4 | 8 | 5‡ | Home from state hospital |
| 13 | 14 | 45 | 18 | To private sanatorium |
| 14 | 10 | 30 | 16 | |

[*] There were no complications in this series.
† Certified to state hospital.
‡ Received 8 more treatments at state hospital.

CASE 1.—A 30-year-old schizophrenic had been mentally ill for about five years before she gave birth; her condition was aggravated during pregnancy. She felt that she could not relax. She had obsessive doubts about religion and sex, could not sleep, and was afraid of the dark. Electroshock treatment was begun in her fourth month of pregnancy and terminated in her sixth month. After 16 treatments, she showed improvement. However, a week before delivery, her symptoms became very severe and she became unmanageable. She received two additional treatments, one seven days and the other three days before delivery. Treatment was reinstituted 11 days post partum and was continued for two months. At the end of that time the patient had received 18 postpartum treatments and had improved considerably.

Case 2.—A 40-year-old patient who was eight months pregnant was suffering from a schizophrenic reaction. She was para 3, gravida 6. About one week prior to admission, she began to complain that she was not feeling well and that she was having dizzy spells. She felt that the baby did not have much life in it. She began acting and talking in a strange manner; she heard voices arguing with her and seemed to be fighting with people who were not present. During the first few days of hospitalization, she was markedly disturbed and agitated. She was out of contact and had hallucinations. Her speech was disconnected and irrelevant. She expressed paranoid ideas regarding her husband. In fact, it was necessary to give her sedatives and restrain her in a strait jacket. She was dehydrated, and her temperature was 103 F (39.4 C).

Because of her high temperature and lack of response to other forms of therapy, she was started on electroshock therapy. Only grand mal seizures were induced. Treatment was begun 35 days before delivery, and she received 17 treatments during the following 20 days. She improved considerably; she became manageable, made good contact, and was oriented and cooperative. She occasionally became depressed and had episodic crying spells, complaining that something was going to happen to her, that her hands were getting smaller, that her lips were changing, and that there was something wrong with her body. She received an additional treatment on the 10th and 7th days before delivery. On the sixth day before delivery, she was confined to bed and placed on a salt-free, high-protein diet because of her elevated blood pressure, which had risen from 120/92 to 170/100 mm. Hg. On the third day before delivery, she became assaultive and paranoid. She received further treatments on the second day and on the day before delivery and again (her 22nd treatment) eight hours before delivery. She received another treatment (her 23rd) five hours before delivery, with no immediate change in her condition. She delivered spontaneously a 6 lb., 3 oz. (2,807 gm.), normal, full-term male child. It was reported that she was cooperative throughout delivery.

On the next morning, the patient was oriented and quiet and expressed concern about her poor memory. She knew she had delivered her baby. She said she had behaved badly the previous day and wished to apologize to everyone. On her fourth postpartum day, the patient became uncooperative, unmanageable, and assaultive; electroshock therapy was resumed. She was given further treatments on the fifth, sixth, seventh, and eighth postpartum days, without much change in her condition. She was certified to a state hospital, where she received eight additional treatments. She improved and was discharged home on convalescent care.

## Indications for and Contraindications to Institution of Electroshock Therapy

Any patient in the puerperium who is acutely disturbed, unmanageable, suicidal, or homicidal is a proper subject for electroshock therapy. For affective disorders, electroshock therapy alone is the treatment of choice. If a patient is suffering from a schizophrenic reaction, a combination of electroshock and insulin therapy may be indicated. For the patient with a toxic-exhaustive psychosis, which begins from a few hours to a week after delivery of the baby, antibiotics, vitamins, and adrenal cortical extract should be administered; electroshock therapy is contraindicated, unless it is needed to control hyperactivity. It should be kept in mind that, in a number of patients apparently suffering from toxic-exhaustive states, the confusion they manifest may be covering a manic-depressive or schizophrenic disorder.

There has been some uncertainty as to the time after delivery that electroshock therapy should be begun. Jacobs[3] suggested that therapy should be withheld for the first month after delivery, since it might have some harmful influence on the uterus. Yaskin[18] advised waiting four to six weeks before initiating electroshock treatment. Feldman and co-workers[17] believe that a waiting period of four to six weeks is necessary to allow restitution of the pelvic blood vessels and to prevent embolism. Kraines[15] believes that electroshock therapy should be instituted as quickly as possible after delivery. We feel that, unless there is an imperative need for the treatment, such as uncontrolled hyperactivity, strong suicidal or homicidal trends, unmanageable dehydration fever, or refusal of food or medication, it is probably wise not to subject women to convulsive therapy till after the fourth week post partum.

Women are subject to a number of complications incident to parturition and the puerperium. These complications are endometritis, parametritis, pyemia, and thrombophlebitis. There is danger that the woman with these complications may die from embolism. In fact, it has been estimated that venous thrombosis occurs during the puerperium in 34 out of 10,000 patients and that the death rate from it is 4%. Therefore, the chance of any pregnant woman, who is not receiving electroshock therapy, dying from an embolus is 1 in 7,000. Thus, when electroshock therapy is contemplated for patients with such complications as endometritis, parametritis, pyemia, and thrombophlebitis, the presence of venous thrombosis and the chance that an embolus may be dislodged by the electroconvulsion should be considered. Women in the puerperium should be carefully examined before the administration of electroshock treatment, with special attention given to the presence of fever, abdominal tenderness, pain and swelling of the veins of the lower limbs, and foul lochia. Blood studies should include the determination of the white and red blood cell counts and the sedimentation rate. The urine should be examined for the presence of albumin and blood. A careful history should be obtained as to whether the patient has recently suffered from chills, since this is one of the most common symptoms of any of the postpartum infections.

History of previous thrombophlebitis should also be obtained, as patients who have had previous attacks are prone to further attacks. When any sign or symptom points to the presence of sepsis or thrombophlebitis, it is advisable to postpone the institution of electroshock therapy until the patient has been free from fever for at least a week. If the patient is symptom-free and shows no signs of infection, electroshock therapy is indicated if she refuses food, is unmanageable, suicidal, or homicidal, or is otherwise in such a condition that it would be detrimental to her health to withhold the treatment. If the patient is manageable, it is advisable to wait for at least four weeks post partum before beginning the treatment. This interim will allow time for some restitution of the reproductive organs and pelvic vessels. It will also reduce the chance of the patient's being treated while she is having an occult sepsis; this is liable to occur during the first two weeks after delivery rather than after the first four weeks.

### Control of Postpartum Overactivity

Therapy should first be directed toward overcoming hyperactivity. Early in the puerperium, attempts to control this should be made with the tranquilizing drugs. However, if they fail, intensive electroshock therapy is indicated, as the risk of dislodging an embolus by two or three convulsions, each lasting about 45 seconds, is much less than that of dislodging an embolus by spontaneous overactivity lasting days or weeks. Furthermore, when treatment is given with the patient under full muscle relaxation with succinylcholine chloride, all violent movements of the convulsion are completely abolished; under these circumstances, the patient is running no greater risk of dislodging an embolus than she would if she were quietly walking about. In such patients, control of overactivity may be lifesaving.

At this point, the thought naturally arises that, if it is more dangerous to withhold electroshock therapy from an overactive patient than to administer it under full relaxation with succinylcholine chloride, why not treat all such patients at once with electroshock therapy without attempting to control their overactivity with tranquilizing drugs? This would not be advisable because relatively large doses of succinylcholine are required to fully paralyze a patient's muscles. When large doses of this drug are used, the usual short-lasting apnea, which normally occurs with a moderate dose, is prolonged; and in some patients this may even be fatal. The chance of fatality from large doses of the drug may be as high as 1 in 1,000. Inasmuch as the chance of fatality from an embolus in women in the puerperium not treated with electroshock therapy is 1 in 7,000, it is obvious that it is safer to attempt control of postpartum overactivity with tranquilizers than with shock therapy modified with large doses of succinylcholine. However, when tranquilizers fail to control overactivity, electroshock treatment, with full muscular paralysis, must be employed. After the fourth week, when danger of formation of emboli is greatly diminished, the shock treatment can be modified with moderate doses of succinylcholine (10-20 mg.), sufficient to cause from 75 to 90% relaxation. The danger of a prolonged apnea arising from a moderate dose of the drug is very small, especially if the sensitivity of the patient to a 5-mg. test dose of it has been ascertained prior to the administration of the therapeutic dose.

In our survey, we did not find a single proved instance of embolism caused by electroshock therapy. However, the number of patients studied is insufficient to conclude that there is little risk of dislodgment of emboli during such treatment. Indeed, the risk is still present and is a serious one. Chapman [2] treated three patients with known thrombophlebitis, without complication. The treatment of patients with known thrombophlebitis should be undertaken only after "chemocontrol" has failed. It should be undertaken in the knowledge that it is a calculated risk, and the treatment should be given only after the patient has been fully relaxed with succinylcholine.

When it is decided to temporarily withhold shock treatment, the fact should be kept in mind that in a certain number of patients the psychosis resolves spontaneously without such treatment. However, when it is decided to administer such therapy, the treatment should be frequent enough, daily if necessary, until overactivity is controlled. After that, treatment may be reduced to two or three times a week. In general, the patient in the puerperium is best treated in the hospital, although Hill and Keedy [1] point to some advantages of the patient's receiving treatment on an outpatient basis.

### Conclusions

In administering electroshock therapy to women with puerperal psychoses, one should give special attention to the presence of sepsis, especially thrombophlebitis, as there is some danger of dislodging an embolus that may prove fatal during the convulsion. Although our statistics show that it is relatively safe to treat a parturient woman early in the puerperium, we do not feel that the experience so far is extensive enough to draw definite conclusions. We suggest that electroshock treatment of the patient should be postponed until after the fourth week post partum. If this is not possible, the shock therapy should then be given as an emergency measure. This therapy should be given with succinylcholine chloride used as a muscle relaxant; this greatly minimizes the danger of dislodging an embolus. Once electroshock therapy is undertaken, it should be carried out vigorously, especially when the patient is disturbed and agitated. When the patient's disturbed behavior is controlled, the frequency of the treatments may be diminished.

There is no proved case in the literature of such treatment having caused the dislodgment of an embolus that proved fatal; nevertheless, danger does exist. Electroshock therapy is the treatment of choice of the woman in the puerperium who shows manic-depressive symptoms and of all patients who show uncontrolled hyperactivity or unmanageable dehydration fever. For schizophrenic reactions, this treatment combined with insulin therapy produces better results.

40 Fifth Ave. (11) (Dr. Impastato).

#### References

1. Hill, A. H., and Keedy, D. M.: Psychoses Related to Childbirth, Texas J. Med. **47**:635-638 (Sept.) 1951.

2. Chapman, E. A.: Psychiatric Problems Associated with Obstetrics (Personal Study of 90 Cases), M. Woman's J. (no. 5) **54**:17-21 (May) 1947.

3. Jacobs, B.: Aetiological Factors and Reaction Types in Psychoses Following Childbirth, J. Ment. Sc. **89**:242-256 (April) 1943.

4. Laboucarié, J.: Étude comparative de 36 cas de psychoses puerpérales, Ann. méd.-psychol. **107**:231-235 (July) 1949.

5. Harris, H. P., Jr.: Postpartal Psychotic Reactions, New Orleans M. & S. J. **103**:109-112 (Sept.) 1950.

6. Bos, C.: Psychiatry in Obstetrics, McGill M. J. **19**:176-178 (Oct.) 1950.

7. Hemphill, R. E.: Incidence and Nature of Puerperal Psychiatric Illness, Brit. M. J. **2**:1232-1235 (Dec. 6) 1952.

8. Hegarty, A. B.: Post-Puerperal Recurrent Depression, Brit. M. J. **1**:637-640 (March 12) 1955.
9. Bower, W. H., and Altschule, M. D.: Use of Progesterone in Treatment of Post-Partum Psychosis, New England J. Med. **254**:157-160 (Jan. 26) 1956.
10. Abély, P.: Hypothalamus et troubles psychiques, Ann. méd.-psychol. **109**:417-434 (April) 1951.
11. Balduzzi, E.: La psychose puerpérale: Essai d'interprétation pathogénique, Encéphale **40**:11-43, 1951.
12. Delay, J.; Corteil, A.; and Boittelle, G.: Explorations cyto-hormonales au cours des psychoses du post-partum, Ann. méd.-psychol. **106**:62 (Jan.) 1948.
13. Kino, F. F., and Thorpe, F. T.: Electrical Convulsion Therapy in 500 Selected Psychotics, J. Ment. Sc. **92**:138-145 (Jan.) 1946.
14. Von Hagen, K. O.: Mental Illness Following Pregnancy, Calif. & West. Med. **58**:324-327 (June) 1943.
15. Kraines, S. H.: Treatment of Psychiatric States Following Pregnancy, Illinois M. J. **80**:200-204 (Sept.) 1941.
16. Williams, R. L., and Barrera, S. E.: Observations and Opinions Concerning Complications and Contraindications in Electric Convulsive Therapy, Psychiat. Quart. **24**:800-809 (Oct.) 1950.
17. Feldman, F.; Susselman, S.; Lipetz, B.; and Barrera, S. E.: Shock Treatment of Psychoses Associated with Pregnancy, J. Nerv. & Ment. Dis. **103**:494-502 (May) 1946.
18. Yaskin, J. C.: Symposium on Recent Advances in Gynecology and Obstetrics: Some Psychiatric Problems in Obstetrics and Gynecology: Diagnosis and Treatment, M. Clin. North America **29**:1508-1524 (Nov.) 1945.

# ROENTGENOGRAPHIC EVALUATION OF COARCTATION OF THE AORTA IN INFANTS

Richard G. Lester, M.D., Alexander R. Margulis, M.D.
and
Charles M. Nice Jr., M.D., Ph.D., Minneapolis

• *Diagnostic and prognostic factors were studied in 30 cases of coarctation of the aorta in which either surgery or autopsy was performed within the first year of the patient's life. Two important considerations were the patency of the ductus arteriosus and the location of the coarctation, whether proximal or distal to the ductus arteriosus. The largest group of patients consisted of 11 infants with a patent ductus and the coarctation proximal to the ductus (type 2A). In this situation there is little stimulus to the development of collateral circulation. Two infants in this group were saved by surgical intervention; the other nine died. The best prognosis was in type 1B, represented by eight infants in whom the coarctation was distal to a patent ductus arteriosus; five of these were saved by surgical intervention. Exact diagnosis is important in deciding whether surgery is likely to prove lifesaving in these conditions. The physical examination must include observation of the distribution of cyanosis over the body, inequalities of blood pressure in the extremities, and especially thorough roentgenographic study, which is essential.*

Coarctation of the aorta has been considered a common cause of cardiac difficulty in the adult age group but a rare cause of morbidity in infants. In recent years, however, it has become apparent that there are a sizable number of deaths in the infant age group as a result of this lesion. Calodney and Carson [1] were among the first to point this out. They reported 21 autopsies of patients in the infant age group; the oldest was 20 months of age, the others under 6 months of age. That the lesion is relatively common is attested to by many authors. In a series of 1,395 patients with congenital heart disease reported by Gasul and his associates,[2] coarctation of the aorta was diagnosed in 78 patients. Abbott,[3] in her series of 1,000 autopsy specimens from patients with congenital heart disease, established diagnosis of coarctation in 178 cases; in 85 it was the primary lesion. It should be noted that in Calodney and Carson's series only 27% had another cardiovascular anomaly that was incompatible with survival. Interestingly, an additional nine patients in their series had an interventricular septal defect. Data on the patients included in our study are shown in the table.

Because surgical correction of this lesion in the infant age group has become an accomplished reality,[4] we felt it would be wise to review our material in an attempt to discover how roentgenographic findings could aid in saving the lives of such patients. Gross [5] has pointed out that it is unwise to operate on these patients during the infant period if they can be tided over medically, because ". . . there is little assurance that the growth of the anastomotic site will keep pace with that of the individual." That there is a sizable group that will not survive the first year is apparent from the studies of Calodney and Carson,[1] of Bahn, Edwards, and DuShane,[6] and others. With these patients in mind, we undertook this analysis.

From the Department of Radiology, University of Minnesota Medical School.

Read before the Section on Radiology at the 105th Annual Meeting of the American Medical Association, Chicago, June 13, 1956.

## Classification

Coarctations of the aorta have been classified in several different ways. The old terms "adult type" and "infantile type" have largely fallen into disrepute because of the confusing nature of these words. The classification made by Clagett, Kirklin, and Edwards,[7] with some modification, is the one used in this paper. Coarctations are thus classified in relation to the position of the ductus arteriosus or ligamentum arteriosum and are distinguished as type 1: coarctation distal to the ligamentum or ductus, (A) with ligamentum arte-

riosum and (B) with a patent ductus arteriosus; and type 2: coarctation proximal to the ligamentum or ductus, (A) with a patent ductus arteriosus and (B) with ligamentum arteriosum. We have reversed the order of ductus and ligamentum in type 2 as compared with type 1 because types 1A and 2A represent typical and opposed pathophysiological entities, while the other types represent variants.

Some writers have questioned whether this method of classification is worthwhile. Sloan and Cooley[8] divide their patients into a group with coarctation between the origin of the left subclavian artery and the ductus or ligamentum, the coarctation being of such type as to permit its excision with end-to-end anastomosis; another group with the coarctation in the same region but not permitting end-to-end anastomosis; and a third group with coarctation not at the usual site. There is considerable merit to this, especially from the surgical point of view. However, it is important to keep in mind that the shape of the heart within the chest depends on the pathological physiology. In each of the types we have outlined the physiological stresses differ and, as a result, the size and shape of the chambers and great vessels are changed. It is because of this that we feel that the classification given is a fruitful one from the radiologist's point of view, as well as from the point of view of the pathologist and clinician.

In those cases of type 1, there is a strong stimulus to the formation of collateral circulation around the coarctation. Since there is obstruction of the blood flow to the trunk and lower extremities, the establishment of collateral circulation begins early, probably in utero.[9] If the patient survives, this eventuates in the typical picture of coarctation, with left-sided enlargement and with enlargement of the collateral circulation around the coarctation, such as the brachiocephalic vessels and the intercostal vessels.

In coarctation of type 2, however, there is little or no stimulus to the formation of collateral circulation, since the trunk and lower extremities receive their supply from the right side of the heart via the ductus arteriosus. In consequence, the roentgenogram, as well as the clinical picture in certain respects, varies from that in type 1. Occasionally the ductus closes in such a patient (with coarctation of type 2B) after birth. In such a case, a severe load is placed upon the left side of the heart, which must then supply the lower portion of the body through the coarctation without the benefit of adequate collateral pathways.

## Material

This study consists of a series of 30 cases, in all of which surgery or autopsy was performed within the patient's first year of life, with the exception of one case in which the diagnosis was made when the patient was 6 weeks of age but operation was performed when the child was 4 years of age. In each case the patient's condition was classified, with the main emphasis being on anatomic data but with clinical and physiological data also being used. (Radiologic data did not influence the type classification.) The coarctations in 17 patients were type 1 and in 13 type 2. This contrasts sharply with the results when diagnoses are made in older patients. Most of the coarctations recognized in later childhood or adulthood are type 1. Nonetheless, it appears to us to be of considerable importance that more than 50% of these children, all of whom were seriously ill, had coarctation of the usually recognized "adult type." In addition, six patients had subendocardial fibroelastosis; eight, interventricular septal defect; four, bicuspid aortic valve; and one, a probable antenatal closure of the foramen ovale.

## Clinical Data

Because these patients present the signs and symptoms of general cardiac disease, the diagnosis is not easily established. Unlike in older age groups, in which the presenting complaints may specifically point to the presence of coarctation, the most common problem in the infant age group is heart failure. Nineteen of our patients showed evidence of heart failure, ranging from mild to marked. Some of the others had repeated bouts of respiratory infection or failed to grow. All but six of the patients had a murmur, usually described as systolic over the precordium, often to the left of the sternum, and occasionally easily audible in the back. Seventeen patients had a history of spells of cyanosis, and several of these patients were thought to be cyanotic on admission to the hospital. The femoral pulse could not be palpated in 11 patients and was weak or faint in 9 others.

*Results in Thirty Patients in Whom Coarctation of the Aorta Was Diagnosed Before One Year of Age*

| Results | Type of Coarctation* | | | |
|---|---|---|---|---|
| | 1A | 1B | 2A | 2B |
| Died | ... | 2 | 7 | 1 |
| Operated on and died | 5† | 1 | 2 | ... |
| Operated on and living | 4 | 5 | 2 | 1 |
| Totals | 9 | 8 | 11 | 2 |

* Classification of Clagett and others,[7] modified.
† Three of these patients also had fibroelastosis, and 2 also had an interventricular septal defect.

Electrocardiograms were obtained in 27 patients. There did not appear to be any consistent pattern in patients with coarctation of type 1. Most, although not all, of the patients with coarctation of type 2 had right-axis deviation and evidence of right ventricular hypertrophy. The most important clinical sign is decreased blood pressure in the leg as compared with that in the right arm. This was present in every patient in whom blood pressure determination was made, with one exception. This patient had a complete interruption of the aorta proximal to the left subclavian artery (type 2A). In this patient, there were equal blood pressure levels in upper and lower extremities. The difficulty of obtaining accurate readings of blood pressure with the use of a cuff in infants has been pointed out many times. At the University of Minnesota Hospitals the flush method described by Barsanti and co-workers[10] is used. It is interesting to note that in four patients, three of whom died within a month of life, the symptoms were so nondition, the no blood pressure determination w be seen in the left side of the heart.

8. Hegarty, A. B.: Post-Puerperal Recurrent Depression, Brit. M. J. **1**:637-640 (March 12) 1955.
9. Bower, W. H., and Altschule, M. D.: Use of Progesterone in Treatment of Post-Partum Psychosis, New England J. Med. **254**:157-160 (Jan. 26) 1956.
10. Abély, P.: Hypothalamus et troubles psychiques, Ann. méd.-psychol. **109**:417-434 (April) 1951.
11. Balduzzi, E.: La psychose puerpérale: Essai d'interprétation pathogénique, Encéphale **40**:11-43, 1951.
12. Delay, J.; Corteil, A.; and Boittelle, G.: Explorations cyto-hormonales au cours des psychoses du post-partum, Ann. méd.-psychol. **106**:62 (Jan.) 1948.
13. Kino, F. F., and Thorpe, F. T.: Electrical Convulsion Therapy in 500 Selected Psychotics, J. Ment. Sc. **92**:138-145 (Jan.) 1946.
14. Von Hagen, K. O.: Mental Illness Following Pregnancy, Calif. & West. Med. **58**:324-327 (June) 1943.
15. Kraines, S. H.: Treatment of Psychiatric States Following Pregnancy, Illinois M. J. **80**:200-204 (Sept.) 1941.
16. Williams, R. L., and Barrera, S. E.: Observations and Opinions Concerning Complications and Contraindications in Electric Convulsive Therapy, Psychiat. Quart. **24**:800-809 (Oct.) 1950.
17. Feldman, F.; Susselman, S.; Lipetz, B.; and Barrera, S. E.: Shock Treatment of Psychoses Associated with Pregnancy, J. Nerv. & Ment. Dis. **103**:494-502 (May) 1946.
18. Yaskin, J. C.: Symposium on Recent Advances in Gynecology and Obstetrics: Some Psychiatric Problems in Obstetrics and Gynecology: Diagnosis and Treatment, M. Clin. North America **29**:1508-1524 (Nov.) 1945.

# ROENTGENOGRAPHIC EVALUATION OF COARCTATION OF THE AORTA IN INFANTS

Richard G. Lester, M.D., Alexander R. Margulis, M.D.
and
Charles M. Nice Jr., M.D., Ph.D., Minneapolis

• *Diagnostic and prognostic factors were studied in 30 cases of coarctation of the aorta in which either surgery or autopsy was performed within the first year of the patient's life. Two important considerations were the patency of the ductus arteriosus and the location of the coarctation, whether proximal or distal to the ductus arteriosus. The largest group of patients consisted of 11 infants with a patent ductus and the coarctation proximal to the ductus (type 2A). In this situation there is little stimulus to the development of collateral circulation. Two infants in this group were saved by surgical intervention; the other nine died. The best prognosis was in type 1B, represented by eight infants in whom the coarctation was distal to a patent ductus arteriosus; five of these were saved by surgical intervention. Exact diagnosis is important in deciding whether surgery is likely to prove lifesaving in these conditions. The physical examination must include observation of the distribution of cyanosis over the body, inequalities of blood pressure in the extremities, and especially thorough roentgenographic study, which is essential.*

Coarctation of the aorta has been considered a common cause of cardiac difficulty in the adult age group but a rare cause of morbidity in infants. In recent years, however, it has become apparent that there are a sizable number of deaths in the infant age group as a result of this lesion. Calodney and Carson [1] were among the first to point this out. They reported 21 autopsies of patients in the infant age group; the oldest was 20 months of age, the others under 6 months of age. That the lesion is relatively common is attested to by many authors. In a series of 1,395 patients with congenital heart disease reported by Gasul and his associates,[2] coarctation of the aorta was diagnosed in 78 patients. Abbott,[3] in her series of 1,000 autopsy specimens from patients with congenital heart disease, established diagnosis of coarctation in 178 cases; in 85 it was the primary lesion. It should be noted that in Calodney and Carson's series only 27% had another cardiovascular anomaly that was incompatible with survival. Interestingly, an additional nine patients in their series had an interventricular septal defect. Data on the patients included in our study are shown in the table.

Because surgical correction of this lesion in the infant age group has become an accomplished reality,[4] we felt it would be wise to review our material in an attempt to discover how roentgenographic findings could aid in saving the lives of such patients. Gross [5] has pointed out that it is unwise to operate on these patients during the infant period if they can be tided over medically, because ". . . there is little assurance that the growth of the anastomotic site will keep pace with that of the individual." That there is a sizable group that will not survive the first year is apparent from the studies of Calodney and Carson,[1] of Bahn, Edwards, and DuShane,[6] and others. With these patients in mind, we undertook this analysis.

From the Department of Radiology, University of Minnesota Medical School.

Read before the Section on Radiology at the 105th Annual Meeting of the American Medical Association, Chicago, June 13, 1956.

## Classification

Coarctations of the aorta have been classified in several different ways. The old terms "adult type" and "infantile type" have largely fallen into disrepute because of the confusing nature of these words. The classification made by Clagett, Kirklin, and Edwards,[7] with some modification, is the one used in this paper. Coarctations are thus classified in relation to the position of the ductus arteriosus or ligamentum arteriosum and are distinguished as type 1: coarctation distal to the ligamentum or ductus, (A) with ligamentum arte-

riosum and (B) with a patent ductus arteriosus; and type 2: coarctation proximal to the ligamentum or ductus, (A) with a patent ductus arteriosus and (B) with ligamentum arteriosum. We have reversed the order of ductus and ligamentum in type 2 as compared with type 1 because types 1A and 2A represent typical and opposed pathophysiological entities, while the other types represent variants.

Some writers have questioned whether this method of classification is worthwhile. Sloan and Cooley [8] divide their patients into a group with coarctation between the origin of the left subclavian artery and the ductus or ligamentum, the coarctation being of such type as to permit its excision with end-to-end anastomosis; another group with the coarctation in the same region but not permitting end-to-end anastomosis; and a third group with coarctation not at the usual site. There is considerable merit to this, especially from the surgical point of view. However, it is important to keep in mind that the shape of the heart within the chest depends on the pathological physiology. In each of the types we have outlined the physiological stresses differ and, as a result, the size and shape of the chambers and great vessels are changed. It is because of this that we feel that the classification given is a fruitful one from the radiologist's point of view, as well as from the point of view of the pathologist and clinician.

In those cases of type 1, there is a strong stimulus to the formation of collateral circulation around the coarctation. Since there is obstruction of the blood flow to the trunk and lower extremities, the establishment of collateral circulation begins early, probably in utero.[9] If the patient survives, this eventuates in the typical picture of coarctation, with left-sided enlargement and with enlargement of the collateral circulation around the coarctation, such as the brachiocephalic vessels and the intercostal vessels.

In coarctation of type 2, however, there is little or no stimulus to the formation of collateral circulation, since the trunk and lower extremities receive their supply from the right side of the heart via the ductus arteriosus. In consequence, the roentgenogram, as well as the clinical picture in certain respects, varies from that in type 1. Occasionally the ductus closes in such a patient (with coarctation of type 2B) after birth. In such a case, a severe load is placed upon the left side of the heart, which must then supply the lower portion of the body through the coarctation without the benefit of adequate collateral pathways.

## Material

This study consists of a series of 30 cases, in all of which surgery or autopsy was performed within the patient's first year of life, with the exception of one case in which the diagnosis was made when the patient was 6 weeks of age but operation was performed when the child was 4 years of age. In each case the patient's condition was classified, with the main emphasis being on anatomic data but with clinical and physiological data also being used. (Radiologic data did not influence the type classification.) The coarctations in 17 patients were type 1 and in 13 type 2. This contrasts sharply with the results when diagnoses are made in older patients. Most of the coarctations recognized in later childhood or adulthood are type 1. Nonetheless, it appears to us to be of considerable importance that more than 50% of these children, all of whom were seriously ill, had coarctation of the usually recognized "adult type." In addition, six patients had subendocardial fibroelastosis; eight, interventricular septal defect; four, bicuspid aortic valve; and one, a probable antenatal closure of the foramen ovale.

## Clinical Data

Because these patients present the signs and symptoms of general cardiac disease, the diagnosis is not easily established. Unlike in older age groups, in which the presenting complaints may specifically point to the presence of coarctation, the most common problem in the infant age group is heart failure. Nineteen of our patients showed evidence of heart failure, ranging from mild to marked. Some of the others had repeated bouts of respiratory infection or failed to grow. All but six of the patients had a murmur, usually described as systolic over the precordium, often to the left of the sternum, and occasionally easily audible in the back. Seventeen patients had a history of spells of cyanosis, and several of these patients were thought to be cyanotic on admission to the hospital. The femoral pulse could not be palpated in 11 patients and was weak or faint in 9 others.

*Results in Thirty Patients in Whom Coarctation of the Aorta Was Diagnosed Before One Year of Age*

| Results | Type of Coarctation* | | | |
|---|---|---|---|---|
| | 1A | 1B | 2A | 2B |
| Died | ... | 2 | 7 | 1 |
| Operated on and died | 5† | 1 | 2 | ... |
| Operated on and living | 4 | 5 | 2 | 1 |
| Totals | 9 | 8 | 11 | 2 |

* Classification of Clagett and others,[7] modified.
† Three of these patients also had fibroelastosis, and 2 also had an interventricular septal defect.

Electrocardiograms were obtained in 27 patients. There did not appear to be any consistent pattern in patients with coarctation of type 1. Most, although not all, of the patients with coarctation of type 2 had right-axis deviation and evidence of right ventricular hypertrophy. The most important clinical sign is decreased blood pressure in the leg as compared with that in the right arm. This was present in every patient in whom blood pressure determination was made, with one exception. This patient had a complete interruption of the aorta proximal to the left subclavian artery (type 2A). In this patient, there were equal blood pressure levels in upper and lower extremities. The difficulty of obtaining accurate readings of blood pressure with the use of a cuff in infants has been pointed out many times. At the University of Minnesota Hospitals the flush method described by Barsanti and co-workers [10] is used. It is interesting to note that in four patients, three of whom died within the first month of life, the symptoms were so nonspecific that no blood pressure determination was recorded.

The presence of differential cyanosis is also a most important clinical sign for diagnosis. With the presence of a reversing patent ductus, the trunk and lower extremities may be blue while the head and arms are of normal color. In association with a lowered level of blood pressure in the legs, the presence of differential cyanosis is diagnostic of type 2A coarctation.

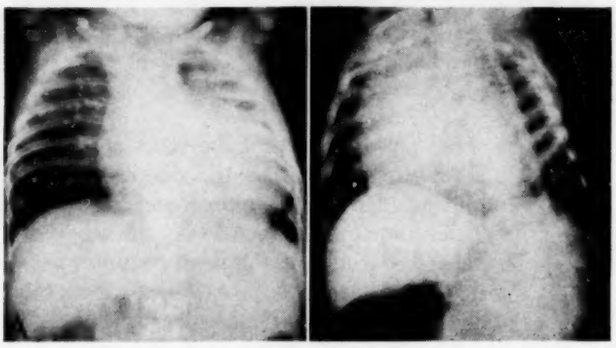

Fig. 1.—Roentgenograms showing type 1A coarctation distal to the ligamentum arteriosum in a 7-month-old male infant. *A*, enlargement of heart to left. Pulmonary vasculature is normal. This patient also had subendocardial fibroelastosis. *B*, left anterior oblique view, showing considerable left ventricular enlargement.

## Roentgenographic Findings

*Findings in Type 1A.*—Type 1A is the classic form of coarctation. The coarctation lies distal to the ligamentum arteriosum. In all our cases cardiomegaly was demonstrated on roentgenographic examination. (Patients without clinical evidence of disease were not included in this series, and many patients with this type of coarctation undoubtedly show no cardiomegaly at the infant age.) In the posteroanterior view, most of

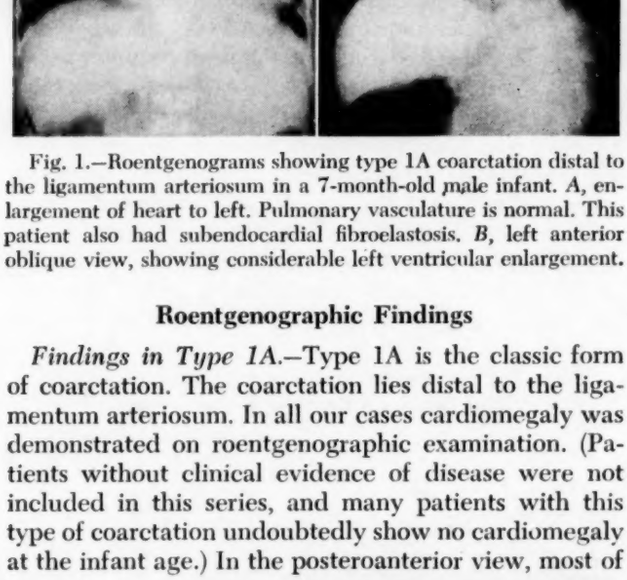

Fig. 2.—*A*, lateral roentgenogram after a swallow of barium, showing coarctation of type 1A in a 5-month-old female. Note left atrial enlargement in view. *B*, retrograde aortogram in another patient with type 1A coarctation who also had an interventricular septal defect. Presence of some collateral channels is demonstrated. Pulmonary vasculature is increased, but there is no contrast material in pulmonary vessels.

the heart is seen to the left of the spine (fig. 1*A*). In the left anterior oblique view, there is enlargement of the heart backward and downward (fig. 1*B*). These findings are indicative of the presence of left ventricular enlargement. Left atrial enlargement was also seen in each of the patients in this group (fig. 2*A*). The pulmonary vasculature is within normal limits, unless a complicating factor is present (see below). In most of the patients the aorta was not clearly visible on the roentgenogram. In one patient there was flattening of the aorta in the region of the coarctation in the posteroanterior view. When this is present, it can be a valuable sign. The presence of notching of the ribs was not encountered in any of the patients in our series.

*Findings in Type 1B.*—In type 1B coarctation there is a patent ductus arteriosus proximal to the site of coarctation. (In some cases the ductus actually runs into the coarctation. The absence of cyanosis distally in such a case indicates that the coarctation is of type 1 rather than type 2.) The presence of the coarctation in this situation tends to increase the left-to-right shunt through the ductus. Left ventricular and left atrial enlargement is seen on roentgenographic examination in this group (fig. 3*A*). Often there is also enlargement to the right in the posteroanterior view and anteriorly in the left anterior oblique view due to

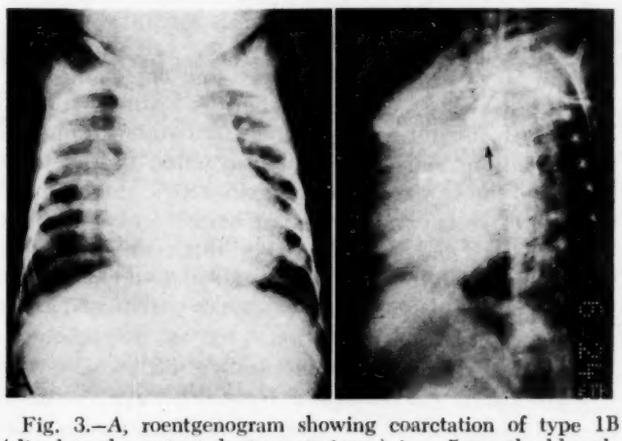

Fig. 3.—*A*, roentgenogram showing coarctation of type 1B (distal to the patent ductus arteriosus) in a 5-month-old male infant. Pulmonary vasculature is greatly increased. *B*, retrograde aortogram showing site of coarctation and simultaneous opacification of arteries. Left-to-right shunt across the patent ductus (arrow) is well demonstrated.

right ventricular enlargement. These patients may demonstrate a markedly enlarged globular heart as a result of both left-sided and right-sided enlargement. The most striking feature, however, is a definite increase in the pulmonary vasculature. The presence of this is correlated with the degree of left-to-right shunt (fig. 3*A*). This finding serves to differentiate this type from type 1A.

*Comment on Findings in Type 1.*—Five of our nine patients with coarctation of type 1A died. In two of these infants the coarctation was complicated by the presence of an interventricular septal defect. In these cases the appearance on conventional roentgenograms is indistinguishable from type 1B because of the presence of a left-to-right shunt. In type 1B, however, retrograde aortography will demonstrate simultaneous opacification of the aorta and pulmonary arteries and may show the site of the ductus arteriosus (fig. 3*B*).

In the three other patients who died, the presence of left-sided subendocardial fibroelastosis was discovered. This raises the interesting possibility that, in the three patients in whom operation was imperative during infancy but who survived, a degree of fibroelastosis may also have been present. The relationship of fibroelastosis to coarctation needs further study. Patients with fibroelastosis alone show roentgenographic findings similar to those noted in infants with coarctation of type 1A.

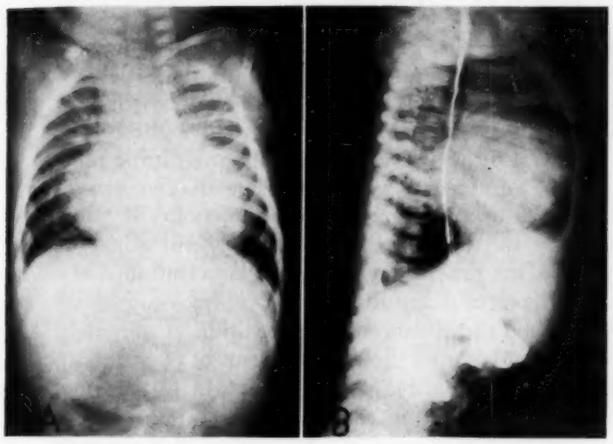

Fig. 4.—*A*, roentgenogram showing coarctation of type 2A (proximal to ductus arteriosus) in a 3-month-old male infant, with considerable enlargement of the heart to right of spine and flattening of left border. *B*, roentgenogram after a swallow of barium, showing marked anterior enlargement in lateral view.

*Findings in Type 2A.*—In type 2A coarctation a patent ductus arteriosus is present distal to the site of coarctation. The right ventricle thus becomes a partial systemic pumper for blood to the trunk and lower extremities. In uncomplicated cases the right ventricle is considerably larger than the left. In the posteroanterior view, a large portion of the heart is seen on the roentgenogram to lie to the right of the spine. The left border of the heart may be flattened or straightened. The appearance then is of a heart located in the center of the chest (fig. 4*A*). In the oblique and lateral views, anterior (right-sided) enlargement is seen (fig. 4*B*). The pulmonary vasculature is mildly increased or within the limits of normal. In some of the patients, however, the left ventricle enlarges due to the presence of subendocardial fibroelastosis. In such cases the appearance on the roentgenogram resembles the more familiar silhouette of type 1 coarctation. The aorta is not usually seen clearly. However, Marks, Shapiro, and Joseph [11] reported a 2-day-old infant in whom they were able to make the diagnosis by noting a flattening of the aorta at the site of coarctation in the posteroanterior view.

*Findings in Type 2B.*—Occasionally the ductus arteriosus in a type 2 coarctation becomes obliterated. In such a case a marked strain is placed on the left ventricle, since collateral circulation is poor and the circulation to the trunk and lower extremities is across the coarctated segment. There are two such cases in this series. In both cases left-sided and right-sided enlargement were seen on roentgenographic examination. One of the patients was operated on at 11 months of age. Roentgenographic examination when the patient was 10 months of age showed marked cardiomegaly with marked left ventricular and left atrial enlargement (fig. 5). A previous roentgenogram, made when the patient was 6 months of age, showed the left ventricular enlargement to be less prominent and the right enlargement more specifically present. Left atrial enlargement was present but not as strikingly. It is possible that the ductus may have been closing at the earlier date. The pulmonary vasculature appeared normal at both examinations. It is important to note that this patient survived surgery and is still alive.

### Special Roentgenographic Procedures

Retrograde aortography and angiocardiography hold places of considerable importance in the diagnosis of coarctation. These procedures are also of great help in the precise analysis of the pathology in certain cases. When the clinical and roentgenographic information obtained by conventional means clearly points to a specific diagnosis, the performance of special procedures is not necessary and, indeed, in view of the added risk involved, may not be indicated.

Retrograde aortography is the most successful means of demonstrating the presence of the coarctation itself. Examination is performed in the steep right posterior oblique projection. A rapid injection of a 35% solution of iodopyracet (Diodrast) concentrated is made, usually into the left brachial artery. When the differential diagnosis lies between coarctation of type 1B and type 1A with an intracardiac left-to-right shunt, the information obtained from retrograde aortography will be of particular value (fig. 2*B* and 3*B*).

Angiocardiography is particularly valuable in the diagnosis of type 2A coarctation. Examination is performed with use of the steep right posterior oblique projection, and a 70% solution of sodium acetrizoate (Urokon sodium) is injected, usually into the cephalic vein at the antecubital fossa. The right-to-left shunt across the patent ductus arteriosus in type 2A coarctation may thus be demonstrated, and, in addition, the site and nature of the coarctation may be seen in the later phase after the filling of the left side of the heart.

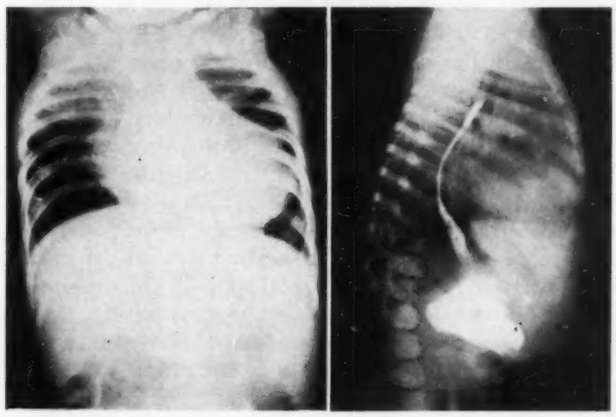

Fig. 5.—*A*, roentgenogram showing coarctation of type 2B (proximal to the ligamentum arteriosum) in an 11-month-old male infant. There is a striking similarity to type 1A coarctation. *B*, roentgenogram after a swallow of barium.

At times, both procedures may have to be performed to arrive at a precise diagnosis. In the case of complete interruption of the aorta distal to the right innominate artery and proximal to the site of the patent ductus, angiocardiography combined with retrograde aortography, with injection into the right brachial artery is particularly useful.

Artificial pneumomediastinum has been shown to have a distinct place in the diagnosis of coarctation.[12] At our institution we are currently evaluating this technique in animals with surgically induced coarctation and plan to use it in infants.

### Differential Diagnosis

The roentgenographic evaluation of infants with congenital heart disease is a part of the physical examination of such patients. It should be approached as a clinical procedure, with the other clinical information kept clearly in mind. The importance of the roentgenographic findings is twofold. They may suggest the diagnosis of coarctation and stimulate the physician to evaluate the patient along other lines in an attempt to confirm the diagnosis. When the diagnosis of coarctation has been suggested by other clinical data, the roentgenographic findings may point to one or another of the several types of coarctation. The findings on conventional roentgenograms may indicate the necessity for special roentgenographic procedures, cardiac catheterization, or other modes of investigation. In all cases it is important to remember that the roentgenographic findings alone are not pathognomonic, and the differential diagnosis must be kept clearly in mind.

In type 1A, subendocardial fibroelastosis alone cannot be differentiated by conventional roentgenographic examination. Aortic valvular stenosis may give a roentgenographic picture similar to that of coarctation. An aberrant left coronary artery arising from the pulmonary artery also is said to give a similar picture. This entity is probably extremely rare. We do not have a record of an instance of this lesion in our files.

In type 1B, the dominant features on conventional roentgenograms are those dependent on the left-to-right shunt. Patent ductus alone may, thus, give a picture indistinguishable from this type, as may other left-to-right shunts, especially interventricular septal defect, aortic-pulmonic window, and atrioventricular canal. In our experience, the presence of left atrial enlargement should serve to distinguish this from shunts such as interatrial septal defect (secundum type) and anomalous pulmonary venous return. In these two lesions left atrial enlargement is not ordinarily present on roentgenographic examination in this age group. Truncus arteriosus and single ventricle may also be difficult to distinguish from type 1B coarctation by the use of conventional films.

When coarctation of type 2A shows the typical roentgenographic appearance that has been described, the differential diagnosis includes antenatal closure of the foramen ovale and reversing patent ductus arteriosus, alone and in combination with general hypoplasia of the arch of the aorta. It is well to remember that coarctation is often complicated by the presence of other cardiac anomalies, such as subendocardial fibroelastosis, and that the roentgenographic appearance therefore varies.

As pointed out above, the roentgenographic appearance of type 2B is usually indistinguishable from that of type 1A. In our series of cases this was the least common form.

### Conclusions

Roentgenographic examination is important as a part of the physical examination of infants with congenital heart disease, and it is necessary for the roentgenograms to be interpreted in the light of the other clinical information. The roentgenographic findings are of value in two ways: 1. The diagnosis may be suggested on the basis of the roentgenograms, thus stimulating the clinician to make a careful study of the patient for possible existence of coarctation. 2. In cases in which the diagnosis has already been suggested or established the roentgenographic findings may help to differentiate among the several forms of coarctation. Because of the possibility of saving life by surgical intervention in certain cases of coarctation in the infant age group, great importance should be placed on the accurate diagnosis of coarctation during the first months of life.

412 Union St. S. E. (14) (Dr. Lester).

This study was aided by a grant from the Minnesota Heart Association.

#### References

1. Calodney, M. M., and Carson, M. J.: Coarctation of Aorta in Early Infancy, J. Pediat. **37**:46-77 (July) 1950.

2. Gasul, B. M., and Fell, E. H.: Salient Points in Clinical Diagnosis of Congenital Heart Disease: Based on Nine-Year Study of 1,395 Patients, J. A. M. A. **161**:39-44 (May 5) 1956.

3. Abbott, M. E.: Atlas of Congenital Heart Disease, New York, American Heart Association, 1936.

4. Kirklin, J. W., and others: Surgical Treatment of Coarctation of Aorta in 10-Week-Old Infant, Circulation **6**:411-414 (Sept.) 1952. Adams, P.; Keele, M.; and Baronofsky, I.: Coarctation of Aorta in Infants, Journal-Lancet **75**:66-69 (Feb.) 1955.

5. Gross, R. E.: Coarctation of Aorta, Circulation **7**:757-768 (May) 1953.

6. Bahn, R. C.; Edwards, J. E.; and DuShane, J. W.: Coarctation of Aorta as Cause of Death in Early Infancy, Pediatrics **8**:192-202 (Aug.) 1951.

7. Clagett, O. T.; Kirklin, J. W.; and Edwards, J. E.: Anatomic Variations and Pathologic Changes in Coarctation of Aorta: Study of 124 Cases, Surg. Gynec. & Obst. **98**:103-114 (Jan.) 1954.

8. Sloan, R. D., and Cooley, R. N.: Coarctation of Aorta: Roentgenologic Aspects of 125 Surgically Confirmed Cases, Radiology **61**:701-721 (Nov.) 1953.

9. Rossi, E.: Herzkrankheiten in Saeuglingsalter, Stuttgart, Germany, Georg Thieme Verlag, 1954.

10. Barsanti, A. H.; Penick, R. W.; and Walsh, B. J.: Flush Technic in Determination of Blood Pressure in Normal Infants and in Infants with Coarctation of Aorta, Clin. Proc. Children's Hosp. Washington, D. C. **10**:175-182 (Sept.) 1954.

11. Marks, D. N.; Shapiro, R. S.; and Joseph, L. J.: Roentgenographic Diagnosis of Coarctation of Aorta in 2-Day-Old Infant, J. Pediat. **43**:453-456 (Oct.) 1953.

12. Giraud, G.; Betoulieres, P.; Latour, H.; and Pelissier, M.: Pneumostratigrammes mèdiastinaux dans quatre cas de coarctation aortique: Étude spéciale des caracteres du segment sous-strictural, Arch. mal. cœur **46**:790-797 (Sept.) 1953.

# PANCREATOGRAPHY—INDICATIONS AND OBSERVATIONS

Henry Doubilet, M.D., Maxwell H. Poppel, M.D.
and
John H. Mulholland, M.D., New York

• *It was found possible to carry out pancreatography during abdominal operations by sectioning the sphincter of Oddi transduodenally and inserting a fine plastic tube for a distance of 4 to 5 cm. into the opening of the pancreatic duct that is found in the posterior wall of the ampulla of Vater. In the absence of acute inflammation, only the larger duct system of the pancreas was delineated, but in the presence of early edema more of the finer ducts became visible and the whole pancreas was outlined faintly. In the presence of acute inflammation the whole pancreas is opacified. Roentgenograms have been obtained showing pseudocyst of the pancreas, dilatation of the pancreatic duct as a result of partial obstruction by calculi, stenosis of the pancreatic duct following a splenectomy, and obstruction of the duct after operation for treatment of a large pseudocyst.*

Although successful procedures have been developed for the roentgenographic visualization of the biliary tract, this has not been achieved until recently in the case of the pancreas. A new technique of pancreatography [1] has increased our knowledge of the pathological process in pancreatitis and has helped to establish principles of treatment based on anatomic and physiological observations.

When the sphincter of Oddi is sectioned transduodenally, a fine plastic tube can be inserted for a distance of 4 to 5 cm. into the opening of the pancreatic duct that is found in the posterior wall of the ampulla of Vater. Radiopaque solution (70% sodium acetrizoate [Urokon sodium]) is injected slowly, about 10 cc. over a five-minute period, the last 2 cc. being introduced during the x-ray exposure. The excess amount will flow into the duodenum, around a tube, or through the accessory pancreatic duct when it is present. If the pancreatic duct is dilated, or if the pancreas has been incised to remove stones, the plastic tube is left in situ for drainage.[2] Two sutures are placed to hold this tube in the pancreatic duct, and it is then led up the common duct and out through the cystic duct, or alongside a T-tube in the common duct (fig. 1). Postoperative serial pancreatographic studies can be carried out to follow the regression of inflammation or of cysts.

## Indications for Pancreatographic Studies

Pancreatographic studies were found to be of value for the following indications: (1) to determine the presence of acute inflammation or edema, (2) to opacify the whole pancreas deliberately, (3) to demonstrate the presence of dilatation of the ducts, (4) to demonstrate the presence of cysts, cystic dilatations, and pseudocysts, (5) to search for a cyst in the presence of a persistently high serum amylase level, (6) to demonstrate the patency of the main pancreatic duct, (7) to demonstrate complete absence of a connection between the main pancreatic duct and a cyst, and (8) to demonstrate obstruction of the pancreatic duct by utilizing the accessory pancreatic duct.

*Determination of Presence of Acute Inflammation or Edema.*—As a rule, when acute inflammation is present, the pancreas is swollen and hard; occasionally it is surrounded by an exudate or by areas of fat necrosis. However, it may be buried retroperitoneally, and the only evidence of an acute process may be increased firmness and prominence of the lobules or a sensation of bogginess. In the absence of acute inflammation, the pancreatogram reveals only the main ducts (fig. 2). With mild residual edema, the smaller ducts are visualized (fig. 3) due to a decrease in the pressure of pancreatic secretion. In the presence of acute inflammation, the duct epithelium loses its characteristic quality of semipermeability and the radiopaque solution permeates the acinar tissue. The acute process may be localized, as in the body or tail, or may involve the whole pancreas. Serial pancreatograms may be made after the resolution of acute inflammation. When the acute process subsides, the tissues are no longer opacified.[3]

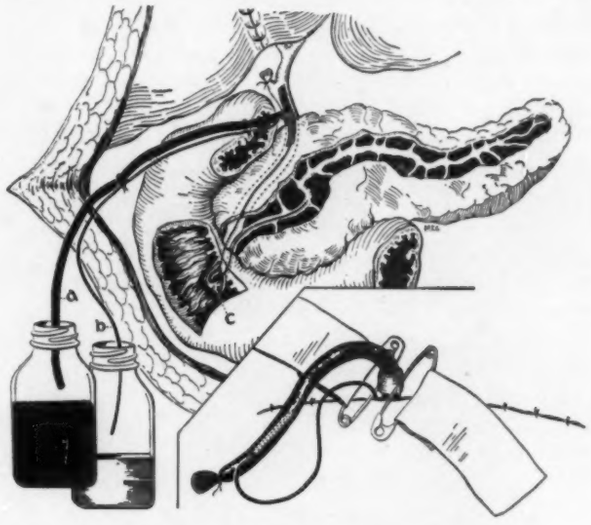


Fig. 1.—Drainage of pancreatic duct. Polyvinyl tube (*b*) passes alongside T-tube (*a*), through lower end of T lying in common duct, through cut sphincter of Oddi (*c*), and up pancreatic duct. Bile and pancreatic juice are collected separately. After four days T-tube is tied and polyvinyl tube inserted into it by means of needle (*inset*), allowing pancreatic juice to circulate back into duodenum. In absence of a T-tube, plastic tube is brought out through cystic duct.

From the departments of surgery and radiology, New York University College of Medicine, and the Third (New York University) Surgical Division, Bellevue Hospital.

Read before the Section on Radiology at the 105th Annual Meeting of the American Medical Association, Chicago, June 12, 1956.

*Deliberate Opacification of Whole Pancreas.*—The principles illustrated by these observations may be applied to delineate the presence of a tumor such as an adenoma. Although a suitable case, in which an adenoma is visualized, has not been available so far, we have been able to visualize the whole pancreas at will and, on occasion, demonstrate the absence of an extra-acinar mass. Iodopyracet (Diodrast) produces a

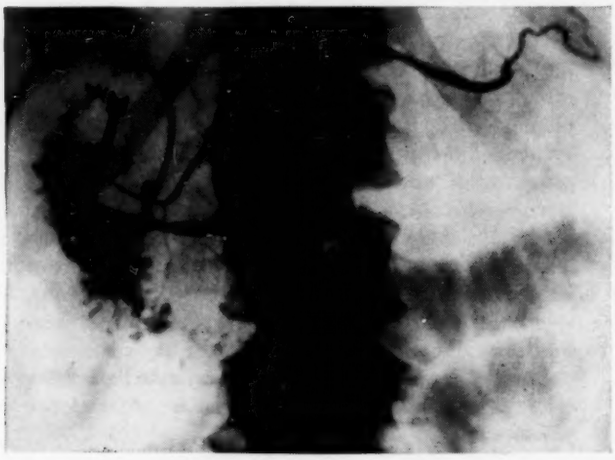

Fig. 2.—Operative pancreatogram. In absence of acute inflammation, it delineates only duct system of pancreas. Plastic tube passes through stump of cystic duct, down choledochus, makes loop in duodenum, and passes up pancreatic duct 4 to 5 cm. Note accessory pancreatic duct (arrow).

transient acute inflammation of the duct epithelium. If the normal pancreas is injected to visualize the duct system, and then reinjected after 10 minutes, all the acinar tissue will be opacified and any structure not in continuity with the duct system should be visualized.

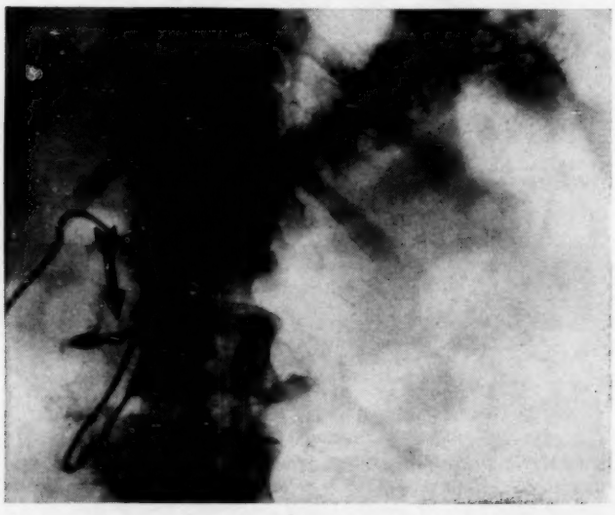

Fig. 3.—Operative pancreatogram, showing dilatation not only of pancreatic duct but also of accessory pancreatic duct (arrow). Note that, in presence of early edema, most of finer ducts are visualized and whole pancreas is outlined faintly.

*Demonstration of Presence of Dilatation of Ducts.*—In advanced chronic pancreatitis, the ducts are typically dilated and often sacculated (fig. 3). If the dilatation is marked, the duct can be drained advantageously for several weeks through an indwelling plastic tube.

*Demonstration of Presence of Cysts, Cystic Dilatations, and Pseudocysts.*—True cysts of the head of the pancreas cannot be palpated if they are acute and small in size. Pancreatographic studies will demonstrate them. Reduction of the pressure in the pancreatic duct by means of sphincterotomy and drainage of the duct will cause shrinkage and eventual disappearance of the cyst. Similarly, the cystic dilatations and abscesses that occur in the tail of the pancreas as a result of recurrent attacks will diminish in size and heal after sphincterotomy.

The same principle can be applied to pseudocysts of the pancreas.[4] They form essentially as a result of rupture of fine ducts into the retroperitoneal space during an acute necrotizing process. These pseudocysts enlarge and persist because of the increased pressure in the pancreatic ducts resulting from spasm of the sphincter of Oddi. Since the pseudocysts are in direct communication with the main pancreatic ducts, pancreatography will fill them and demonstrate their presence and extent (fig. 4). When a tube is left in place, either in the pancreatic duct or in the pseudocyst, the disappearance of the pseudocyst can be fol-

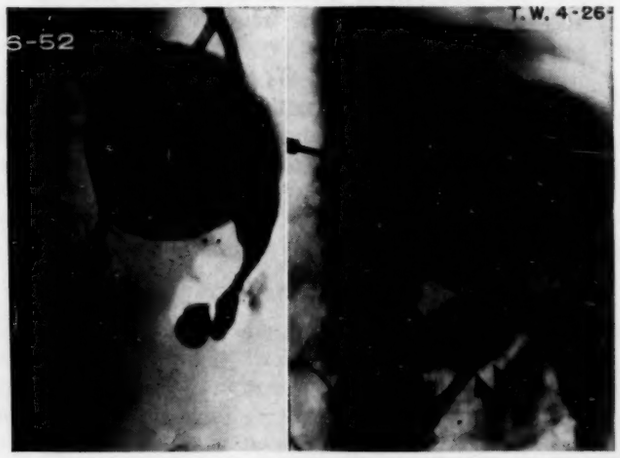


Fig. 4.—Examples of pseudocyst of pancreas demonstrated by pancreatographic studies. *A*, demonstration of pseudocyst in left upper quadrant that had been hidden by overlying mass of inflammatory tissue and adherent organs. *B*, demonstration of huge pseudocyst lying in posterior mediastinum (single arrow) that had not been revealed on x-ray of chest and direct abdominal exploration. Note opacification of tissues of pancreas (arrows) due to presence of residual edema.

lowed by serial pancreatograms. Similarly, a persistent pancreatic fistula resulting either from marsupialization of a pseudocyst or after accidental trauma will close readily if the intraductal pressure is reduced by sphincterotomy.

*Search for Cyst in Presence of Persistent High Amylase Level.*—It has been our experience that, if a patient has a persistently high serum amylase level after recovery from an acute attack of pancreatitis, the presence of a pseudocyst should be suspected. At times, even with the abdomen open, such a pseudocyst cannot be palpated due to the presence of massive inflammatory adhesions matting the transverse colon and stomach over the pancreatic area. A pancreatogram will reveal the position and extent of such a pseudocyst (fig. 4). On one occasion the pseudocyst was found to lie in the posterior mediastinum (fig. 4*B*).

*Demonstration of Patency of Main Pancreatic Duct.*—Since the objective of sphincterotomy, in addition to avoidance of further incidents of biliary reflux, is to reduce the pancreatic intraductal pressure, an essential corollary is that no other obstructive factor be present in the duct. Such an assurance can be obtained only by an operative pancreatogram. If partial obstruction is produced by stone or stricture, the stones should be removed by direct incision of the pancreas (fig. 5) or the pancreas resected distal to a stricture (fig. 6). If multiple stones, present in the head, cannot all be removed with certainty, the distal end of the pancreatic duct must be anastomosed to the jejunum in addition to performance of sphincterotomy. Complete obstruction of the pancreatic duct by stone or stricture requires only a sphincterotomy, since the obstructed part becomes asymptomatic as a result of atrophy of the acinar tissue. Similarly, successful treatment of a pseudocyst or pancreatic fistula cannot be achieved by sphincterotomy alone in the presence of partial obstruction of the main pancreatic duct.

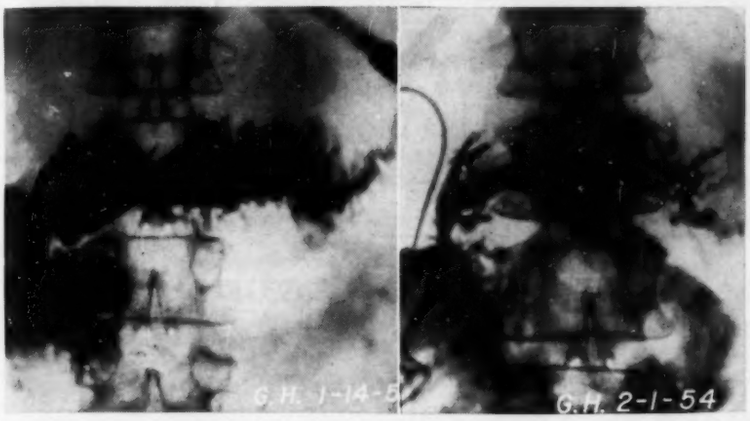


Fig. 5.—*A*, operative pancreatogram, showing enormous dilatation of pancreatic duct as result of partial obstruction by mass of calculi. *B*, after removal of stones by direct incision of head of pancreas, and drainage of pancreatic duct by indwelling plastic tube, caliber of ducts was markedly reduced.

Fig. 6.—Operative cholangiogram, showing partial stricture (arrow) of pancreatic duct incurred during previous splenectomy. Persistent pancreatic fistula was cured only by amputating tail of pancreas up to point of stricture.

*Demonstration of Complete Absence of Connection Between Main Pancreatic Duct and Cyst.*—Old chronic cysts of the head of the pancreas often lose all connection with the main pancreatic duct. Although sphincterotomy is essential to prevent further progress of the basic disease of pancreatitis, the cyst itself must be anastomosed to the jejunum to obliterate it. Similarly, mesenteric cysts, which are residual collections of the exudate that extended into the mesocolon during a previous acute attack, can be excised if they are thin-walled or drained if they are old and thick-walled (fig. 7).

*Demonstration of Obstruction of Pancreatic Duct by Utilizing Accessory Pancreatic Duct.*—At times the lower end of the pancreatic duct is obstructed or destroyed by a severe inflammatory process. It then becomes difficult to locate the opening of the pancreatic duct into the posterior wall of the ampulla of Vater because there is no flow of pancreatic juice. Under such conditions the accessory pancreatic duct can be intubated and the duct system, as well as the site of obstruction, visualized.

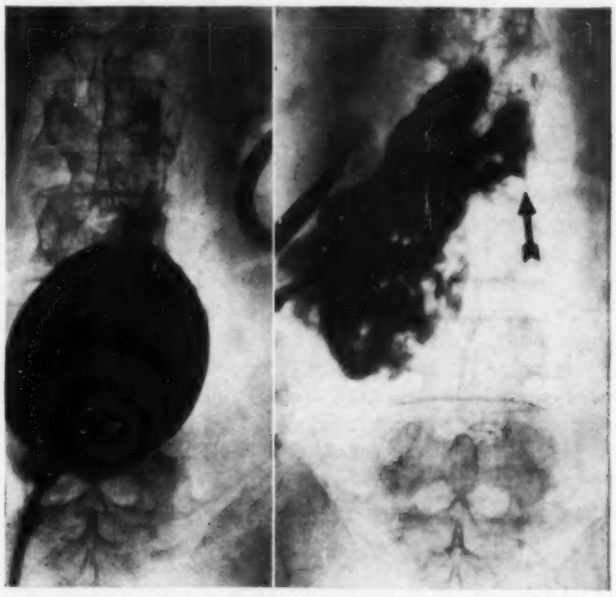

Fig. 7.—Opacification at operation of a mesenteric cyst, *A*, in patient after recovery from acute attack of pancreatitis. No connection to pancreatic ducts can be seen. Operative pancreatogram, *B*, made one-half hour later also fails to reveal any connection to cyst. Pancreatic tissue was opacified due to residual edema. Note complete obstruction of pancreatic duct (arrow) as result of cystogastrostomy performed previously at another institution for treatment of a large pseudocyst.

## Comment

The procedure of pancreatography is no more difficult than the performance of operative cholangiography and is without danger. It requires, however, a

prior transduodenal sphincterotomy and intubation of the pancreatic duct. It not only has yielded valuable information on the variable anatomy of the human pancreas but has added fundamental knowledge to our understanding of the etiology and pathological processes of pancreatitis. Principles upon which the treatment of this disease and the management of its various complications could be based have been developed and proved by clinical trial.

550 First Ave. (16) (Dr. Doubilet).

This study was aided by grants from the National Institutes of Health, U. S. Public Health Service, and the Picker Foundation.

Figures 1, 2, 4A, and 5A are from Doubilet and Mulholland: *J. A. M. A.* **160:**521-528 (Feb. 18) 1956.

**References**

1. Doubilet, H.; Poppel, M. H.; and Mulholland, J. H.: Pancreatography: Technics, Principles, and Observations, Radiology **64:**325-339 (March) 1955.

2. Doubilet, H., and Mulholland, J. H.: Intubation of Pancreatic Duct in Human, Proc. Soc. Exper. Biol. & Med. **76:**113-114 (Jan.) 1951.

3. Doubilet, H., and Mulholland, J. H.: Operative Contrast Visualization of Pancreatic Disease, S. Clin. North America **36:**385-403 (April) 1956.

4. Doubilet, H., and Mulholland, J. H.: Pancreatic Cysts: Principles of Treatment, Surg. Gynec. & Obst. **96:**683-692 (June) 1953.

# CAROTID COMPRESSION IN THE NECK—RESULTS AND SIGNIFICANCE IN CAROTID LIGATION

Elisha S. Gurdjian, M.D., John E. Webster, M.D., Francis A. Martin, M.D.
and
Warren G. Hardy, M.D., Detroit

• *Compression of the carotid artery in the neck was used as a test to predict whether a patient could tolerate a proposed ligation. Following such tests, ligations were carried out in 63 patients. Of these operations, 44 were for aneurysms, 10 for arteriovenous communications, and 9 for carotid cavernous fistulas. In some patients compression or even palpation of the carotid sufficed to cause bradycardia and syncope; if it was possible to abolish the bradycardia with atropine and if the completely atropinized patient withstood carotid compression for 10 minutes, it was assumed that he could undergo carotid ligation with a minimum of complications. If syncope was not prevented by atropine, and the pulse was not slowed on palpation, it was assumed that the cerebral ischemia was of mechanical rather than reflex origin and that the blood supply from the basilar artery and the contralateral carotid was not sufficient to permit the proposed ligation. Complications following the 63 ligations proved to be transient in all but two patients, who had intracranial aneurysms and had been very ill from the beginning. In applying the carotid compression test the electrocardiograph helped to identify vagal effects. The patency of the carotid and basilar arteries should be determined by angiography.*

When a ligation of the common or the internal carotid artery is desirable, evaluation of the competency of the cerebral circulation before the ligation is extremely important. Some authors state that carotid compression tests for this purpose are valueless. Others believe that valuable information may be obtained by use of the Matas test of the carotid.

During the past 19 years, 63 patients had the internal or the common carotid artery (60 common carotid and 3 internal carotid) ligated in the neck for aneurysmal abnormalities, arteriovenous malformations, or carotid cavernous arteriovenous communications. In these 63 instances a carotid ligation was a primary procedure and was not the result of a hemorrhagic complication during an intracranial operation for vascular lesions. There were 44 patients with aneurysms, 10 with arteriovenous malformations, and 9 with carotid cavernous fistulas. This paper will summarize the results of carotid compression tests and our experience with carotid ligation in the neck, including the complications.

## Effects of Carotid Compression

Unilateral digital palpation and/or compression of the carotid arteries in the neck may result in several different effects. These can be summarized as follows:

1. There may be a syncopal effect and bradycardia and/or asystole from glossopharyngeal vagal influences (irritable carotid sinus) (fig. 1). In some cases there may be a precipitous drop in blood pressure. Gentle rotary palpation of the vessel may induce this effect. At times, this reaction is obtained by compression of the carotid not only at the bifurcation but also higher or lower down on the same side. It may also be obtained by manipulations of the throat internally.

From the Wayne University Neurological Surgery Service, Grace Hospital and Memorial Hospital.

Read before the Section on Nervous and Mental Diseases at the 105th Annual Meeting of the American Medical Association, Chicago, June 14, 1956.

2. Compression of the carotid arteries sufficient to stop the flow of blood to the head may result in cerebrovascular insufficiency in some cases, characterized by giddiness, headaches, syncope, and convulsions (fig. 2). When compression of the carotid artery results in such insufficiency, there may be a partial occlusion of the internal carotid artery on the opposite side, a thrombosis of the internal carotid artery on the opposite side, or a generalized atheromatosis of the brain so that compression of the carotid artery on either side causes an inadequate amount of blood flow to the circle of Willis.[1] At the base of the brain inade-

quate posterior and anterior communicating arteries may cause insufficiency when the carotids in the neck are compressed on the side opposite the small or absent communicating vessels. Unconsciousness without a vagal effect and presumably unassociated with compression occlusion of the carotids has been described in the literature (cerebral type of irritable carotid sinus). It is felt that these cases fall in the above group. 3. A combination of irritable carotid sinus with vascular abnormalities resulting in cerebrovascular insufficiency when the carotid bulb is compressed on the side of the irritable carotid sinus (a combination of 1 and 2). This group may be very confusing if not carefully analyzed. Compression tests in such cases may result in vagal effects, with bradycardia and eventual syncope. However, on thorough atropinization, such a patient manifests a syncopal effect without bradycardia or asystole. Unless electrocardiographic or pulse records are obtained, such a case may be difficult to evaluate properly (fig. 3 and 4).

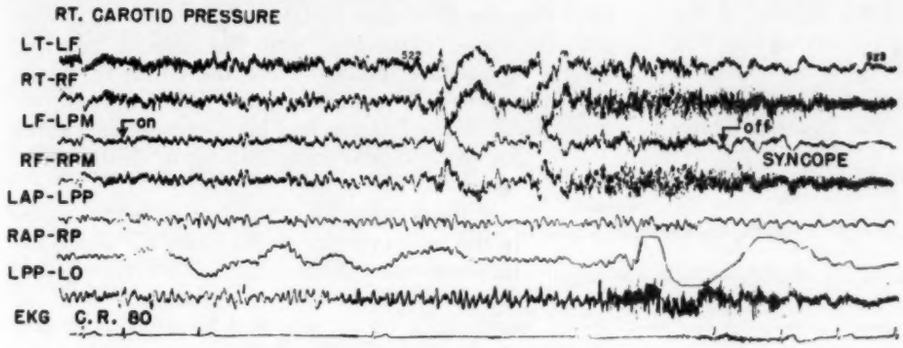


Fig. 1.—Example of "irritable carotid sinus" in patient with metastatic brain tumor. At A, compression of the right carotid has been started. Note the marked bradycardia beginning almost immediately. Syncope begins at B. Abnormalities in the electroencephalographic record began several seconds before the onset of the syncope. The carotid and vertebral angiograms were essentially normal.

Compression of an irritable carotid sinus resulted in bradycardia and in some instances in a lowering of the blood pressure. Bradycardia without change in the blood pressure was also noted. Usually, the patients became drowsy or semiconscious at the end of 6 to 15 seconds of compression. In the older age group, heavier compression was more effective. Among the patients with a vagus effect, the use of adequate doses of atropine permitted compression of the vessels without syncope or bradycardia. In patients with an irritable carotid sinus, the carotid artery on the affected side may be ligated after atropinization and carotid sinus stripping at the time of the operation and before ligation. For this purpose, 1/50 grain (1.2 mg.) of atropine sulfate is given intravenously one hour before operation and another 1/100 grain (0.6 mg.) is given intravenously as the operation is begun. This was done in three patients in this series with no untoward effects.

In patients with cerebrovascular insufficiency and unilateral compression of the carotid arteries unassociated with vagal effects, the electrocardiogram showed no changes in the pattern or the frequency of the cardiac action. A short period of bradycardia followed by normal rhythm (vagal stimulation with escape) was noted in some instances. In the group with no vagal effects, compression that was continued for 15 to 25 seconds or longer thereby stopping the blood flow to the brain resulted in syncope. The systemic pressure remained normal. In patients with a recently ligated common or internal carotid artery, compression of the opposite carotid caused syncope in most cases. In a few instances, compression of the patent carotid, with the opposite vessel having been previously ligated, did not cause syncope. This was explained on the basis that the basilar circulation was adequate in these persons, at least for a short period of time.

In doing neck compression tests, it is important to record the pulse rate and the tracings of the electrocardiogram. The electrocardiographic record may be obtained by using an electrocardiographic recorder or one of the channels of the electroencephalograph. We use the eight-channel electroencephalograph, with one channel recording the heart action and the other seven channels the electroencephalographic changes. The blood pressure is recorded by frequently noting its level either with the ordinary mercury sphygmomanometer or with a Sanborn recorder. The latter necessitates the introduction of a needle into the femoral or the brachial artery. With use of a 17-gauge needle, an 18-gauge plastic tube is passed into the vessel, after which the needle may be removed, leaving one end of the plastic tube in the artery. In this way the recording may be obtained with the patient sitting up. When such fa-

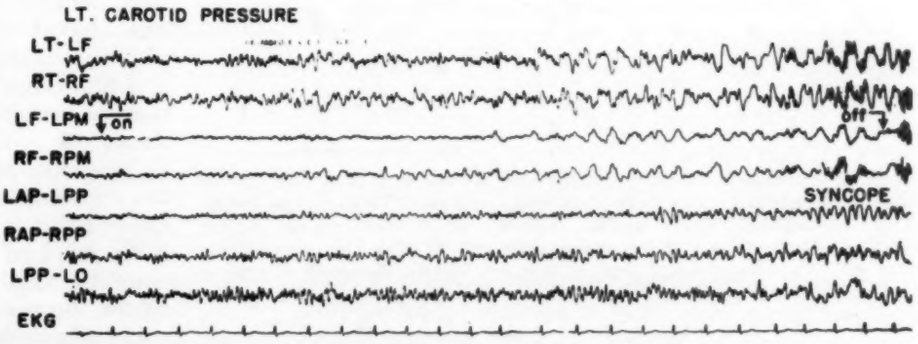


Fig. 2.—Results of carotid compression in patient with thrombosis of right internal carotid artery. Firm compression of the left carotid complex near the angle of the jaw resulted in syncope in 20 seconds. No change in the electrocardiographic record is noted. There is some disorganization of the electroencephalographic record, particularly in the frontal and parietal leads, several seconds before the beginning of syncope.

cilities are not available, the use of the mercury sphygmomanometer certainly is adequate for clinical use.

The value of the electrocardiographic record in patients with irritable carotid sinus cannot be overemphasized. If effects of myocardial ischemia are seen due to a drop in blood pressure, compression should be stopped immediately.

### Complications of Common and Internal Carotid Artery Ligation

The cerebral complications of carotid ligation in the neck may be immediate (within 4 hours) or late (12 to 48 hours). Various causes have been presented to explain the cerebral damage that may complicate unilateral common or internal carotid ligation. However, there is no agreement on the relative importance of these causes.[1A] These include, first, inadequate collateral circulation through the circle of Willis. At times, there may be an unusually small or absent anterior or posterior communicating artery on one or both sides. Windle[1B] and others have discussed the presence of such anomalous communications. Moore and Baker[2] reported such a case. Homans[3] discussed a similar instance. Fetterman and Pritchard[4] also reported an instance of this type. We have seen a similar case showing a marked difference in the size of the two posterior communicating vessels, with the left much smaller. It is likely that, in this instance, a ligation of the carotid artery on the side of the large posterior communicating artery would conceivably result in poor distribution of the circulation in the circle of Willis, with ischemic after-effects.

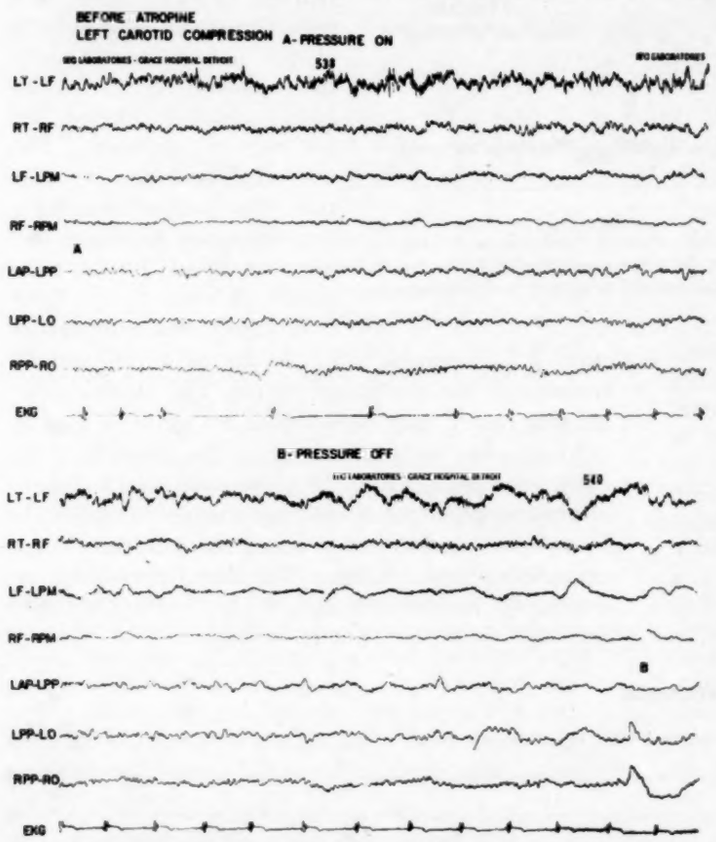


Fig. 3.—Example of bilateral irritable carotid sinus in patient with thrombosis of left internal carotid artery showing vagal effect, with escape on left carotid compression. There was an occlusion of the left internal carotid artery. A, the beginning of the compression and B, when the pressure was taken off. The electroencephalogram became slightly disorganized after a rather lengthy compression, with dysrhythmia more on the left than on the right side.

A second suggested cause, particularly for late complications, has been an ascending carotid thrombosis. This cause has not been frequently reported. Moore and Baker[2] state that, in 11 patients dying after ligation, thrombi were seen distal to the ligature in 3, with one thrombus extending into the middle cerebral artery. In another, emboli were the cause of death. Dandy[5] quoted Zimmerman, who stated that thrombosis distal to the ligation had been present as a cause for neurological complications or death in five cases.

A third cause for complication is the nature of the lesion present in the brain for which the ligation was carried out. Olivecrona[6] and others have recently emphasized that an aneurysm, by its size and location, may prevent collateral blood flow in an otherwise normal circle of Willis. Thrombosis within the aneurysm may also involve its parent vessel. Hunt[7] pointed out that the cerebral damage accompanying a traumatic vascular lesion may lead to complications when that vascular lesion is treated by carotid ligation.

A fourth factor is the role of hypotension at the time of the ligation. Moore and Baker[2] have reported this as a common cause. In their 62 cases of patients with normal blood pressure, the percentage of cerebral complications was 28, with 10 deaths. In 27 patients with subnormal blood pressures, cerebral complications occurred in 87%, or 23 cases, with deaths in 17. These 88 cases were patients with neoplasms of the neck, and 50% of the ligations were nonelective. Abnormalities of blood volume, blood viscosity, and blood chemistry also may be important.

A fifth cause has been the effects of stimulation or irritation of sympathetic pathways from the compressing ligature, resulting in "cerebral vasoconstriction." Leriche emphasized the importance of such a reflex ischemia. Other reflex factors include the carotid sinus reflex involved in the ligation of the internal carotid artery, which increases the pressure within the carotid bulb, while ligation of the common carotid would decrease it. However, these factors have not been substantiated by actual clinical and experimental data.

A sixth and important cause is the presence of a complete or incomplete occlusion of the contralateral internal carotid artery. Such an abnormality may be decisive in causing complications when a common carotid or internal carotid artery has been ligated. The collateral circulation when one carotid has been ligated depends upon the patency of the other carotid and the basilar circulation. Rarely is the basilar circulation

so adequate that both carotids may be compressed without untoward effects. In patients in whom both carotids have been ligated successfully for arteriovenous fistula between the carotid and the cavernous sinus, undoubtedly the basilar circulation must have been adequate. The presence of collateral circulation through the external carotid branches is also important. When Matas' test is positive, it indicates that the opposite carotid and/or the basilar circulation may be inadequate. It is, therefore, important to ascertain the condition of these vessels by angiography.

We believe that the use of neck compression tests and angiography can in most instances determine the adequacy of collateral circulation. By such tests the propriety of a ligation of a carotid may be determined; also, the presence of an irritable carotid sinus does not negate the possibility of successful ligation of the common or the internal carotid. We have done this on several occasions without serious after-effects.

### Analysis of Patients

Of the 63 patients in whom ligation of the common or internal carotid artery was done, among the 44 patients having ligation for an intracranial aneurysm, there were two deaths. One occurred on the 3rd and the other on the 53rd day, postoperatively. Both patients were extremely ill from the beginning and the ligation of the carotid was used as a last resort measure. In another patient who had been very ill from the beginning, carotid ligation did not alter the vegetative state. Six months postoperatively he died, after transfer to another hospital. In this group of 44 cases, there have also been three instances of repeated subarachnoid hemorrhage, with ultimate death.

Among the less serious complications was a slight weakness on the same side as the ligated carotid that appeared in a 48-year-old patient 24 hours after ligation. This cleared up in two days. In another patient, aged 45, there was weakness of the opposite half of the body, that cleared up over a period of several days. This patient's common carotid pressure was 110 mm. Hg and the internal carotid pressure was 60 mm. Hg after ligation. In another patient, aged 25, there was aphasia and paralysis of the right half of the body. There was improvement to normal in three months. The common carotid pressure was 80 mm. Hg, and after ligation the internal carotid pressure was 44 mm. Hg (the tie was not removed since the pressure was 90 mm. Hg on re-exploration 12 hours later).

Among the 44 patients with aneurysm, there were 8 between the ages of 20 and 29; 9 between 30 and 39; 18 between 40 and 49; 7 between 50 and 59; and 2 between 60 and 69. Those with arteriovenous malformations included 5 patients between 20 and 29; 2 between 30 and 39; 2 between 40 and 49; and one between 50 and 59. Those with carotid cavernous fistulas were distributed as follows: one between 20 and 29; one between 30 and 39; two between 50 and 59; two between 60 and 69; and one between 80 and 89.

In the patients with cerebral arteriovenous malformation there were no serious complications after ligation. One patient in the group with carotid cavernous communication, aged 87, developed a weakness of the right half of the body. This improved in two days. The carotid pressure was 110 mm. Hg before and 55 after ligation of the common carotid artery. This patient died as a result of cerebral thrombosis with a left-sided hemiplegia 36 days after operation. She was awaiting transfer to a nursing home.

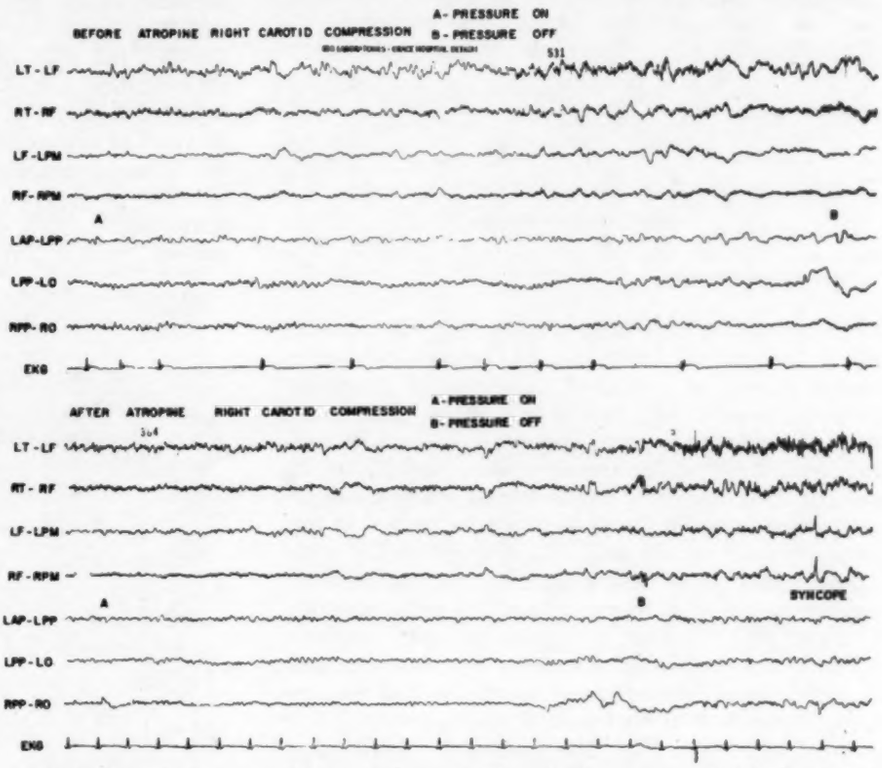


Fig. 4.—Record of same patient as in figure 3. After atropine, syncope is noted at B but with no electrocardiographic changes, the pulse rate remaining normal throughout. In such a case the picture may be badly confused if one does not have a record of the electrocardiogram since a syncopal effect may be attributed to ischemia from carotid compression when it actually may have been due to a heart effect.

In 20 cases the internal carotid artery pressure was recorded before and after ligation. In most cases we used a Tycos sphygmomanometer attached over an air trap to a water column, communicating with the artery through an 18-gauge needle. The mean pressure was obtained before and after ligation. It was noted that before ligation the excursions of the needle were quite marked. After ligation, these excursions became practically nil. The systolic pressure in the arm was usually 20 to 30 mm. Hg higher than that in the neck obtained by this technique. As may be seen in the

accompanying table, in many instances the pressure in the internal carotid dropped to half or a little over half of the preligation pressure. No correlation was noted between the level of the postligation pressure and the complications.

In a few instances the pressure was recorded by the Sanborn recorder continuously for one to two hours after ligation. The findings in this group are interesting and corroborate the conclusions of Sweet and Bennett,[8] Johnson,[9] Bakay and Sweet,[10] Morfit and Gensini,[11] and others. The pressure in the internal carotid artery

*Pressure Readings Before and After Ligation of the Common Carotid Artery*

| Aged 20-29, Mm. Hg | | Aged 30-39, Mm. Hg | | Aged 40-49, Mm. Hg | | Aged 50-59, Mm. Hg | | Aged 80-89, Mm. Hg | |
|---|---|---|---|---|---|---|---|---|---|
| Before | After | Before | After | Before | After | Before | After | Before | After |
| 80 | 44* | 82 | 64 | 110 | 80 | 110 | 42 | | |
| 84 | 50 | 110 | 55 | 100 | 52 | | | | |
| 84 | 58 | 130 | 70 | 96 | 42 | | | | |
| | | | | 98 | 57 | | | | |
| | | | | 110 | 55 | | | | |
| | | | | 110 | 60* | | | | |
| | | | | 80 | 50 | | | | |
| Arteriovenous Malformations | | | | | | | | | |
| 96 | 40 | 92 | 45 | | | 90 | 40 | | |
| 90 | 58 | | | | | | | | |
| 110 | 62 | | | | | | | | |
| Carotid Cavernous Fistulas | | | | | | | | | |
| | | | | | | | | 110 | 55* |

* Cerebral complications.

after ligation of the common carotid dropped to about half of the original level (fig. 5). Immediately after ligation there was a marked narrowing of the pulse pressure (10 mm. Hg), but, over a period of an hour, the pulse pressure became somewhat wider (20 mm. Hg) and the systolic pressure also rose 10 to 25 mm. Hg. This new level was sustained without change for another hour. In figure 6 it may be seen that the initial pressure of 138 mm. Hg dropped to 70, with a pulse pressure of less than 10; later the systolic pressure increased to 80 mm. Hg with a pulse pressure of about 20. Whether this pressure may increase further is not established. In one of our patients, aged 25, with a complicating paralysis, the wound was re-explored and the internal carotid artery pressure was recorded at 90 mm. Hg. The immediate postligation pressure had been 44 mm. Hg. Because of this rather high level of pressure, it was not thought necessary to release the ligature. This patient recovered the use of his totally paralyzed side in three months. In another patient, a 68-year-old female, with thrombosis of the left common carotid at its origin from the aorta explored five days after hemiplegia, the carotid, although patent, did not pulsate. The intracarotid pressure was 38 mm. Hg, and this patient recovered the use of the right half of the body in about one week. No carotid pulsation was felt on the left side of the neck during this period.

Is internal carotid artery ligation more effective than common carotid artery ligation? The records of Morfit and Gensini[11] in normal humans suggest that ligation of the common carotid artery is equally as effective as ligation of the internal carotid artery. The same has been concluded by pressure record studies of Bakay and Sweet.[10]

There were only two instances where a ligation was thought advisable but not carried out because of the untoward effects of the compression tests. There were, of course, many patients with multiple aneurysms in bilateral positions who were not thought to be candidates for ligation of the carotid and others in whom the aneurysms were directly attacked. In one patient, aged 21, not belonging to this series, a craniotomy was performed for the exposure of an arteriovenous malformation, and, because of bleeding, the common and the external carotid arteries were ligated. A contralateral paralysis ensued, which, upon removal of the ligature, completely disappeared in a few hours. Others have had similar experiences (Love[12]).

In patients for elective ligation of the carotid for vascular lesions the age is much lower than in those in whom a ligation is performed during a neck dissection for malignancy. Moore and Baker[2] and others state that these latter may not fare well after carotid ligation. Dandy[5] felt that age was a factor in complications after ligation, the older persons faring poorly. Voris[13] reported 3 deaths among 5 patients in the group over 50 years of age and 4 deaths among 35 patients under 50. In our own group of cases there were 16 patients aged 50 or over; in one of these there was a minor complication with the eventual death of this same patient, from a cerebrovascular accident, and in one

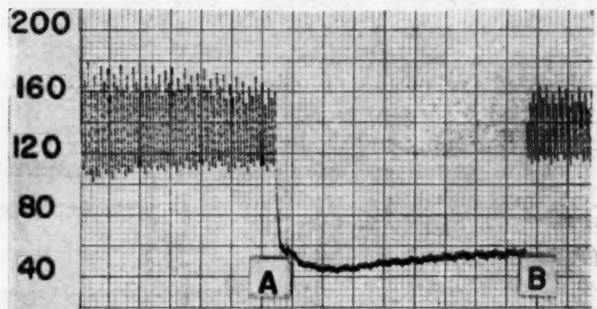


Fig. 5.—Common carotid artery pressure studies. At A, the clamp was applied with a drop of the pressure from 160 mm. Hg systolic to 48. Note the marked narrowing of the pulse pressure, and, at B, the pressure has risen to almost 60 mm. Hg systolic, at which point the clamp was taken off. The record immediately following is about 8 or 10 mm. Hg lower than the initial pressure before the application of the clamp. The lower record is that of respirations.

there was paralysis not related to the carotid artery ligated. With the exception of one patient, 87 years of age, those who died were under the age of 50. In those with complications other than death, the age

was 48 in one instance, 45 in another, and 25 in another. In our small series age does not appear to be an important factor in the production of complications. Moore and Baker [2] also have found that advanced age is not necessarily conducive to complications.

In summary it may be stated that there were four cerebral complications in the entire group, with three being minor and short-lasting. There were three deaths in the hospital related to the patient's condition rather than to the ligation. It has been previously noted that patients with aneurysms and arteriovenous abnormalities appear to have much less difficulty after ligation than patients with neck tumors. Matas [14] ligated the common carotid in 53 cases with two deaths; Schorstein [15] reviewed a group with 13.3% mortality; and Dandy [5] ligated the internal carotid in 88 patients with four deaths. Poppen [16] performed ligation in 101 patients with aneurysms with three deaths and eight hemiplegias, five of which were of fairly permanent nature. Voris [13] reported four deaths and two temporary and seven permanent complications (hemiplegia) among 35 patients under the age of 50. In his group of 40 patients there were seven deaths.

### Management of a Candidate for Carotid Ligation

Where a carotid ligation is thought advisable, whether it be for a carotid aneurysm, an arteriovenous malformation, or a carotid cavernous fistula, our plan of management is as follows: 1. Angiographic studies are carried out, and both carotid and the basilar artery distributions are visualized. If these are found to be satisfactory, a second step involves determining the effects of digital compression of the carotid on the side for the ligation. Compression tests are carried out by electroencephalographic control, including a recording of the electrocardiographic tracings on one channel. However, aside from some slowing in the ipsilateral frontal and parietal leads, the electroencephalographic records have been of little value in prognostications. The time of syncopal effects and the type of syncope are noted and evaluated. If the patient has an irritable carotid sinus, these tests are carried out after complete atropinization. In the presence of an irritable carotid sinus, atropinization permits the compression tests to be performed without any untoward effects. If there is no evidence of an irritable carotid sinus and if compression for 10 minutes does not cause any untoward effects, ligation is carried out under local anesthesia. The pressures in the common carotid and in the internal carotid arteries are recorded. The Sanborn strain-gauge technique is preferable but a Tycos manometer may be used. The vessel is compressed in arterial forceps for 45 minutes to two hours to note abnormalities in the opposite half of the body. When no such changes occur, the vessel is ligated with ¼-in. umbilical tape 4 to 5 cm. below the bifurcation. This tape is tied around the vessel sufficiently tightly to cause complete occlusion but not so tightly as to cause a tearing of the vessel wall. After a square knot, the ends of the tape are held together with a silk suture to prevent slipping. It is simple matter to remove the ligature if the need arises.

Compression of the carotids should be carried out near the angle of the lower jaw, where the vessels are relatively fixed. Lower down the vessels may slip from under the compressing finger. Compression is carried out by an experienced member of the staff. In those instances where compression of the carotid causes untoward effects such as numbness of the opposite half of the body or syncope, repeated compression may be better tolerated. As the tolerance to compression increases, the vessel may be ligated under local anesthesia as above discussed. The use of clamps for partial occlusion of the vessel has been unsatisfactory in our hands. The use of a fascial band around the vessel partially to occlude it also has been unsatisfactory. In such cases the vessel wall was not found compressed on reexploration several weeks later. In patients with carotid cavernous fistula, we have employed the method of ligation of the common carotid, later of the internal carotid, still later of the internal carotid intracranially, if necessary. We have not used

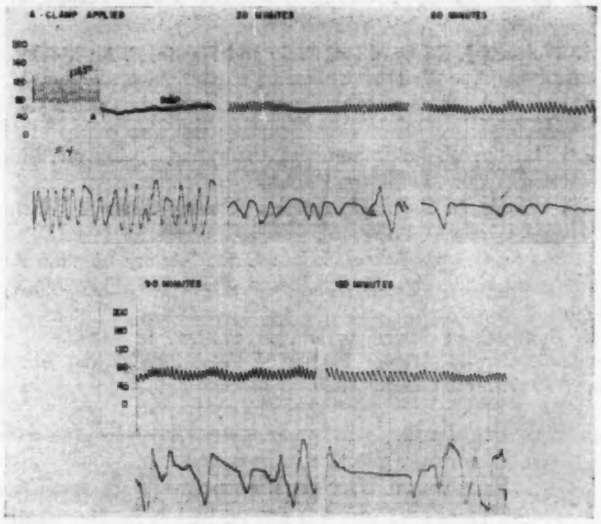

Fig. 6.—Change in the pulse pressure in a two-hour period after ligation of common carotid artery for an arteriovenous malformation in a man 29 years of age. At A, the artery is ligated with a ¼-in. umbilical tape. The pressure has dropped from 138 mm. Hg systolic to 50 and later has risen to 60, still later to 80 mm. Hg. There has been some increase in the pulse pressure, but the pressure remained around 80 mm. Hg throughout.

anticoagulant therapy or cervical sympathetic block as suggested by Poppen [16] and Voris [13] for prophylaxis against possible complications.

### Summary and Conclusions

Carotid compression tests are valuable in order to determine the adequacy of collateral circulation preparatory to ligation of the carotid artery. Angiographic studies to evaluate the patency of the carotid and the basilar arteries should also be carried out. Carotid compression tests should be studied with electrocardiographic control. These tests may reveal at least three types of abnormalities: irritable carotid sinus, cerebrovascular insufficiency from various causes, and a combination of irritable carotid sinus and cerebrovascular insufficiency.

Conditioning of the cerebral circulation by compression and complete occlusion of the internal carotid in the neck is possible. The compression should be carried out by an experienced member of the staff. When the patient is able to stand carotid compression for about 10 minutes, ligation of the carotid can be carried out with a minimum of complications.

If, after carotid ligation, hemiplegia occurs in spite of all precautions, the ligature should be removed with dispatch, if the intracarotid pressure is low (less than half of common carotid pressure). Later another attempt can be made to ligate the vessel. Intracarotid pressure studies after ligation of the carotid artery do not appear to be an accurate index to possible complications. Late complications after ligation probably are due to a low level of arterial pressure in the terminal vessels and/or thrombosis or embolism.

801 David Whitney Bldg. (26) (Dr. Gurdjian).

This study was aided by the Kresge Foundation.

### References

1. Webster, J. E.; Gurdjian, E. S.; and Martin, F. A.: Mechanism of Syncope due to Unilateral Compression of Carotid Bifurcation, A. M. A. Arch. Neurol. & Psychiat. **74:**556-558 (Nov.) 1955.

1A. Hamby, W. B.: Intracranial Aneurysms, Springfield, Ill., Charles C Thomas, Publisher, 1952, p. 524.

1B. Windle, B. C. A.: On Arteries Forming Circle of Willis, J. Anat. & Physiol. **22:**289-293, 1887-1888.

2. Moore, O., and Baker, H. W.: Carotid-Artery Ligation in Surgery of Head and Neck, Cancer **8:**712-726 (July-Aug.) 1955.

3. Homans, J.: Accidents and Precautions in Ligation of Common Carotid Artery: Report of Fatal Hemiplegia, Ann. Surg. **71:**707-718 (Aug.) 1920.

4. Fetterman, J. L., and Pritchard, W. H.: Cerebral Complications Following Ligation of Carotid Artery, J. A. M. A. **112:**1317-1322 (April 8) 1939.

5. Dandy, W. E.: Results Following Ligation of Internal Carotid Artery, Arch. Surg. **45:**521-533 (Oct.) 1942.

6. Olivecrona, H.: Ligature of Carotid Artery in Intracranial Aneurysms, Act. chir. Scandinav. **91:**353-368, 1944.

7. Hunt, J. R.: Role of Carotid Arteries, in Causation of Vascular Lesions of Brain, with Remarks on Certain Special Features of the Symptomatology, Am. J. M. Sc. **147:**704-713, 1914.

8. Sweet, W. H., and Bennett, H. S.: Changes in Internal Carotid Pressure During Carotid and Jugular Occlusion and Their Clinical Significance, J. Neurosurg. **5:**178-195 (March) 1948.

9. Johnson, H. C.: Cervical Intracarotid Pressure Studies: Their Significance in Management of Intracranial Aneurysms, Surgery **33:**537-543 (April) 1953.

10. Bakay, L., and Sweet, W. H.: Intra-Arterial Pressures in Neck and Brain: Late Changes After Carotid Closure, Acute Measurements After Vertebral Closure, J. Neurosurg. **10:**353-359 (July) 1953.

11. Morfit, H. M., and Gensini, G. G.: Intraluminal Pressure in Internal Carotid Artery of Normal Human Beings: Effects of Occlusions of Associated Arteries, Am. Surgeon **20:**204-209 (Feb.) 1954.

12. Love, J. G.: Restoration of Circulation After Removal of Ligature from Internal Carotid Artery, Proc. Staff Meet., Mayo Clin. **19:**375-376 (July 12) 1944.

13. Voris, H. C.: Complications of Ligation of Internal Carotid Artery, J. Neurosurg. **8:**119-131 (Jan.) 1951.

14. Matas, R.: Personal Experiences in Vascular Surgery: Statistical Synopsis, Ann. Surg. **112:**802-839 (Nov.) 1940.

15. Schorstein, J.: Carotid Ligation in Saccular Intracranial Aneurysms, Brit. J. Surg. **28:**50-70 (July) 1940.

16. Poppen, J. L.: Specific Treatment of Intracranial Aneurysms: Experiences with 143 Surgically Treated Patients, J. Neurosurg. **8:**75-102 (Jan.) 1951.

---

**Functional Uterine Bleeding.**—[This condition] would seem best defined as bleeding in the absence of any causative lesion in the uterus. Although most cases occur in the immediately premenopausal era, it is found not infrequently at any age or stage of menstrual life, and actually it is by no means rare to see bleeding, apparently functional in nature, in the postmenopausal era. The mechanism of functional bleeding is not always the same and actually bleeding can occur from any type of endometrium. The pattern may even be secretory or progestational, reflected clinically by the so-called "irregular shedding" . . . . Whether this bleeding is due to an improperly functioning corpus luteum or a refractory endometrium is not certain, but it is manifested by the presence of secretory endometrium late in the bleeding phases when normally the mucosa is completely cast off and beginning to regenerate. Indeed, there are many features of functional bleeding of which we are woefully ignorant, and we can only speculate as to pituitary dysfunction, hormonal imbalance, disturbance of the spiral arteriolar mechanism, etc. It seems likely, however, that the majority of functional hemorrhages are a sequel to anovulation with resultant prolonged unopposed estrogen stimulation. The treatment of this disorder is influenced by two chief factors, the age of the patient and the importance of preserving the reproductive function. A considerable proportion of girls exhibit not only marked irregularity but also moderate excess of menstruation for periods of from several months to several years after initiation of the function. Many of these then, without treatment, fall into a normal mentrual pattern. A similar observation may be made in women approaching the menopause, a certain proportion of whom unquestionably cease ovulating a considerable time before they cease menstruating. Such anovulatory cycles may be moderately excessive. While we very properly teach women that bleeding at this time is never to be looked upon as normal, the fact remains that many women who disregard this teaching cease bleeding spontaneously, through final cessation of ovarian function.—E. R. Novak, Functional Uterine Bleeding, *Obstetrical and Gynecological Survey*, October, 1956.

## CLINICAL NOTES

# CONGENITAL SYPHILIS IN THE ABSENCE OF POSITIVE SEROLOGY IN THE MOTHER

### A THIRD INDICATION FOR THE TREPONEMA PALLIDUM IMMOBILIZATION TEST

Nicholas J. Fiumara, M.P.H., M.D.
and
William Hill, M.D., Boston

In most of the cases in which children present clinical stigmas of congenital syphilis together with a positive reaction to a serologic blood test, the mother also has a positive reaction. If, however, the mother's reaction is negative on repeated examinations, there are several possible explanations. The child may not have had a prenatal infection, or the mother may have been previously infected but have experienced a spontaneous cure by the time of examination. Again, the use of penicillin or other antibiotics for a nonsyphilitic infection may have caused a reversal of the serologic reaction with or without a clinical cure. The case described here illustrates such a diagnostic problem. The significance of this case is apparent when it is considered against the background of medical practice in this antibiotic era.

The use of penicillin in the treatment of gonorrhea and syphilis since 1943 has revolutionized the clinical management of these diseases. Its speed in rendering patients noninfectious has helped to decrease the reservoir of infection in a community. Given time and effective dosages, penicillin will also cure these diseases; with one injection of 360 mg. (600,000 units) of penicillin, patients with acute gonorrhea are made noninfectious in 2 hours or less, and the same injection will cure from 95 to 98% of all patients with acute infections in 24 hours. Early lesions of syphilis will be made noninfectious in 24 hours by a single injection of penicillin, and a rate of cure of 85% or higher can be expected with one course of treatment.[1] Therefore, one must admit that penicillin is an effective drug. Its use, together with the efforts of organized venereal disease control programs, is responsible for the reduction in the incidence of venereal diseases so far obtained. Conversely, failure to diagnose and treat the infected individual and his contacts will result in losing the ground already won.

However, penicillin has not been an unmixed blessing. While it has cured some diseases, it has created new problems and left others unsolved. For instance, modern diagnostic methods have not kept pace with the speed of therapeusis but have actually lagged behind it; it frequently takes a longer time to diagnose than to cure. The therapeutic efficiency made possible by penicillin has tempted some physicians to intellectual sloth, as witness the familiar example of the doctor reaching for the penicillin syringe without first making a diagnosis. When antibiotics are used, properly or intemperately, to treat diseases other than syphilis, the signs and symptoms of syphilis are often masked or delayed. Antibiotic treatment, even when it is inadequate, frequently causes the patient's reaction to standard serologic tests to become negative, making diagnosis of syphilis almost impossible.

Penicillin-resistant strains of organisms are familiar in other fields of medicine, but as yet Treponema pallidum responds to penicillin both clinically and in vitro. There is some evidence that cases of gonorrhea clinically resistant to customary doses of penicillin have at last appeared. The physician is aware of the increase in sensitization reactions that can be seen in 1 to 5% of patients treated with this antibiotic.[2] In hospital population groups, the allergic responses are nearer 5%.

The speed and simplicity of treatment with antibiotics have caused the services of venereal disease clinics to change from inpatient to outpatient care. The ease of clinical management and the relatively low cost of treatment have placed more and more patients under the care of the family physician, and rightly so. However, from the point of view of public health, the increase in private medical care of patients with venereal disease has accentuated the problem of nonreporting by the doctor. It is paradoxical that proportionately fewer patients with gonorrhea and syphilis have been reported by private physicians, although more and more of these patients are being cared for by private practitioners instead of by clinics.[3]

In this transition from treatment in the clinics to treatment by the private physician, the interviewing and investigation of contacts have also suffered. Physicians in private practice do not have time to interview patients for contacts, let alone trace the contacts thus revealed. They admit that they do not have the interest or the skill to do effective interviewing. This is not surprising, since interviewing and tracing contacts require specific talents. Not everyone in public health work, or even everyone in venereal disease

Director, Division of Venereal Diseases, Massachusetts Department of Public Health; Lecturer in Dermatology and Syphilology, Tufts University School of Medicine and Boston University School of Medicine; Clinical Assistant in Dermatology, Massachusetts General Hospital (Dr. Fiumara) and Chief, South Medical Clinic, Massachusetts General Hospital; Instructor in Dermatology, Harvard Medical School (Dr. Hill).

control, has these talents.[4] Careful training is helpful. Trained interviewers are able to discover more contacts and to secure more usable information than are untrained interviewers.[5]

The uncritical attitude of physicians in clinical and public health medicine has been a cause of great concern. There has been a wave of overoptimism and premature rejoicing that gonorrhea and syphilis will be wiped out and that the venereal diseases are no longer a problem. This type of thinking has led some physicians and even some hospital staffs to neglect taking routine blood tests for syphilis and to ignore this disease in differential diagnosis. Often when the diagnosis of syphilis is made and the case history is checked, lost opportunities for early diagnosis and treatment can be noted, particularly if the patient has late syphilis with mucocutaneous, osseous, visceral, cardiovascular, or neurological involvement.[6]

Public health medicine has also participated in this wave of premature rejoicing. Many of those areas of the United States where venereal disease control programs have been disbanded, amalgamated, or deemphasized have shown an increase in infectious syphilis and gonorrhea. There have been some epidemics.[7] This is not surprising. Sexual promiscuity is basic to the spread of venereal disease; as long as there is a reservoir of infection in the community, and as long as the sexual mores of our people continue as they are, cases of syphilis and gonorrhea are inevitable. In the light of this background, the following case is presented.

## Report of a Case

An 8-year-old boy was first seen in 1955 for a diagnostic examination because he had a positive reaction on a Hinton test made when he was placed in a foster home by his mother. He had a number of repeated positive reactions on serologic tests but a negative reaction on a spinal fluid Wassermann test. Physical examination revealed bulging frontal bosses (Parrot's nodes), a saddle nose, and Hutchinson's teeth. A clinical diagnosis of late latent congenital syphilis was made.

Examination of the mother revealed no history suggestive of syphilis and no clinical evidence of syphilis. Standard serologic blood tests for syphilis were repeatedly negative, as was the spinal fluid serology. This was puzzling. If our clinical impression could not be substantiated epidemiologically by an infection in the mother, it would be difficult to maintain even with the presence of congenital stigmas. After all, these defects could be duplicated by other diseases. The alternatives to congenital syphilis were an acquired infection or a chronic biologically false-positive reaction. The boy was not sexually precocious. There was no objective evidence of sexual molestation, and questioning revealed no history of perversion, either homosexual or heterosexual. To rule out a chronic biologically false-positive reaction, the patient was again thoroughly examined; a T. pallidum immobilization (TPI) test was performed and was positive. When repeated, it was again positive. A positive Treponema immobilization test means syphilis.[8] The next question was whether this disease was acquired or of congenital origin.

In spite of repeated examinations, the mother continued to show negative results on the Hinton and Kahn blood tests. Thereupon she received a Treponema immobilization test that gave positive results and when repeated was again positive. Our clinical impression of congenital syphilis in the boy was substantiated, and a diagnosis of syphilis was also established in the mother. However, an infected mother with repeated negative reactions on blood tests for syphilis and without a history of treatment was unusual, and an intensive investigation of her medical past was begun.

*Mother's History.*—The mother of the patient had been married twice and had one child by the first husband and four by the second. She denied any miscarriages or abortions. The first marriage took place in 1938. The premarital blood test performed on husband and wife by a private physician gave negative results (this was verified). A female child was delivered at a community hospital in 1940, and, on March 7, 1940, the prenatal blood test reaction was negative (verified). This child, now aged 16, has had repeated negative serologic blood tests for syphilis and a negative Treponema immobilization test. In 1942, the mother and father were divorced, and he later died at sea during World War II. He had no record of hospitalization, nor was he seen by a physician, so that, other than the report of a negative reaction on the premarital Hinton blood test in 1938, no medical record of this man is available.

The second marriage of the patient's mother took place in January, 1946, with the ceremony performed twice, once in another state, where, the wife stated, the premarital blood test gave negative results for both husband and wife. She did not remember the name of the physician, and efforts to trace him were fruitless. Because her divorce decree was not final, she went through another ceremony on Feb. 27, 1947, in Massachusetts, five months after the birth of the first child by her second marriage.

During the first pregnancy of this marriage, the mother was seen by at least two private physicians and had three hospital admissions, two prior to delivery and the third at term. When she was three or four months pregnant the woman was admitted with a diagnosis of threatened miscarriage. Neither the private physician prior to admission nor the hospital during her inpatient stay performed the prenatal blood test for syphilis. When the woman was six months pregnant she was referred for admission by another physician with a diagnosis of upper respiratory infection and possible atypical pneumonia. Neither the private physician nor the hospital performed a Hinton blood test. In September, 1946, the woman was admitted to the same hospital in labor and delivered a full-term male child, the patient in this case. Twelve hours after admission and following delivery she complained of a chill and had a temperature of 102.8 F (39.3 C). On the following morning she complained of a headache and sore throat and had a "maculopapular rash of the face, trunk, and extremities." She was isolated for possible scarlet fever and a throat culture was taken. Her white blood cell count was 23,000 per cubic millimeter, with 47% lymphocytes (one atypical large cell), 45% polymorphonuclear leukocytes, 5% eosinophils, and 2% monocytes. The throat culture revealed hemolytic streptococci, Micrococcus pyogenes var. albus, and gram-positive diphtheroids, all penicillin-sensitive.

She was immediately placed on therapy with penicillin, 30,000 units every three hours for a total of 870,000 units. She rapidly became symptom-free, and the rash disappeared. The diagnosis of the consultant was toxic erythema. No blood test for syphilis was taken, either when she was admitted to the hospital in labor or when the eruption occurred.

It is our belief that this woman had the signs and symptoms of secondary syphilis; namely, headache, sore throat, and maculopapular eruption on her face, trunk, and extremities. Furthermore, the high percentage of lymphocytes is consistent with secondary syphilis and not with toxic erythema.

There are two valid criticisms of the management of this case. The first is that syphilis was not considered in the differential diagnosis of the maculopapular eruption; the second is that no Hinton's blood test was done. The failure to recognize the rash as a secondary eruption is of less importance than the failure to think of syphilis and the omission of the blood test. Up to this point, there had been at least two, and possibly four, lost opportunities to prevent this case of congenital syphilis. This was also the first opportunity to diagnose and treat the mother's condition early in the course of the disease.

As already stated, a second marriage ceremony was performed when the patient was 5 months old. A blood test on the mother the day after this ceremony gave positive results. The doctor had no record of a blood test performed on the husband. His records show that he gave the wife six injections of oxophenarsine (Mapharsen) hydrochloride and then lost sight of her. He did not report this case; he did not examine the husband or report him as a marital contact; he obtained no history of prior pregnancies, nor did he examine the two children. Finally, when the mother failed to return for continued treatment, he did not report her.

The patient's mother became pregnant for the second time with her second husband, and during this third pregnancy she was examined by a private physician. A prenatal blood test was reported as showing positive results on Dec. 17, 1947, one year and three months after her last delivery and the generalized maculopapular eruption. The physician persuaded the patient to bring in her husband, and he finally appeared on Feb. 1, 1948. His blood test was also positive. Neither the husband nor the wife returned to the physician, and neither was reported by him as having syphilis or for failing to return for diagnostic examination or treatment.

The mother next appeared in labor at a large municipal hospital and was admitted for delivery. No prenatal or postpartum blood test was performed. She delivered a male child, who at the time of our examination of her elder son was 7 years old. He has had repeated negative reactions on blood tests and on a Treponema immobilization test. The chance of a mother with untreated early latent syphilis delivering a full-term uninfected infant is about 20%.[9]

In the following year, 1949, the mother had a cesarean section and delivered a female child. During hospitalization she received 2,700,000 units of penicillin. This is the first objective evidence, three years after probable infection, that the mother received minimal effective therapy for syphilis, although the treatment was directed entirely toward the prevention of a possible postoperative infection. The presence of syphilis was unsuspected, as no blood test was performed. The child was examined by us at the age of 5 years and showed negative reactions on blood and Treponema immobilization tests.

The last delivery was also by cesarean section, and the prenatal blood test at this hospital on April 24, 1951, showed a negative result. This result, which occurred five years after possible infection and two years after penicillin treatment, is entirely consistent with the expected serologic outcome in early latent syphilis that is treated. The mother delivered a male child in September of that year and during hospitalization received 4,800,000 units of penicillin and 3.5 gm. of streptomycin. The male infant, when examined by us at age 4, had a negative reaction to Hinton's blood test and a negative Treponema immobilization test.

*Father's History.*—The patient's father had a criminal record dating from the age of 15. From 1932 to 1940 he had served at least six prison sentences. No blood tests were taken during his incarceration except one on Jan. 4, 1941, which gave a negative result. In 1943 he joined the armed forces, and during his military service there was no entry in his medical record that he suffered from or received treatment for a venereal disease. Furthermore, a Kahn test on Nov. 27, 1945, incident to separation from the service, was negative. From 1945 to 1955 the man served at least two prison sentences, and a blood test was negative on Sept. 14, 1952. But on Feb. 1, 1948, he had a positive reaction on a Hinton test, his wife having had a positive blood test the previous December. He did not return to the physician, nor was he reported as a case, or for failing to return for a diagnostic examination or treatment. He was divorced in 1954, and his present whereabouts are unknown to either his wife, the police, or state and local correction departments.

## Comment

An 8-year-old boy with some of the stigmas of congenital syphilis had repeated positive reactions on Hinton's blood tests and a negative spinal fluid serology. Although the clinical impression was that of congenital syphilis, this diagnosis was temporarily clouded because of the absence of a positive reaction on a blood test for syphilis in the mother. However, the diagnosis was confirmed when the reaction to the Treponema pallidum immobilization test on the mother's blood was positive. The disease in the mother was also confirmed epidemiologically after an extensive investigation of approximately six month's duration.

Until now there have been two indications for the Treponema immobilization test: (1) to distinguish between the biologically false-positive and true-positive blood test for syphilis and (2) to assist in establishing a diagnosis of syphilis in patients who have clinical evidence of the disease, particularly in late syphilis, but who have negative blood and spinal fluid serologic tests. To these should be added a third indication: to assist in the diagnosis of syphilis in a patient with epidemiologic evidence of the disease, but with negative clinical and serologic findings. This third indication is illustrated by the case presented here.

By far the greatest value of this case report is its revelation of the number of opportunities lost by the examining physicians to diagnose syphilis in the parents and prevent congenital syphilis. Congenital syphilis in our times is preventable, but acquired syphilis will continue to plague us until more adequate control measures can be devised. Our present methods cannot eradicate syphilis. There will always be a reservoir of infection in the community, and the sexual mores of our people will determine whether this reservoir will increase or decrease. If control efforts are relaxed, if physicians are lulled by complacency, then it must follow that epidemics of syphilis and the other venereal diseases will occur in the future.

Room 204, 15 Ashburton Pl. (Dr. Fiumara).

### References

1. Fiumara, N. J.: Venereal Diseases—Present and Future, Am. J. Pub. Health **43**:1443-1451 (Nov.) 1953.

2. Feinberg, S. M., and Feinberg, A. R.: Allergy to Penicillin, guest editorial, J. A. M. A. **160**:778-779 (March 3) 1956.

3. National VD Data, Graphic Presentation, Division of Venereal Disease, United States Public Health Service, 1953.

4. Bauer, T. J.: Venereal Disease Control in Transition, Pub. Health Rep. **67**:17-20 (Jan.) 1952.

5. Fiumara, N. J.; Segal, J.; and Jolly, J.: Venereal Disease Contact Investigation: Combined Military-Civilian Program, Pub. Health Rep. **68**:289-294 (March) 1953.

6. Thomas, E. W., and others: Factors Leading to Development of Late Manifestations of Syphilis, Am. J. Syph. **38**:531-553 (Nov.) 1954.

7. Today's V. D. Control Problem, Third Annual Joint Statement by the Presidents of the Association of State and Territorial Health Officers, New York, American Social Hygiene Association, 1956.

8. Some Facts About the T. P. I. Test, Publication 83, Massachusetts Department of Public Health, Division of Venereal Diseases, Nov. 17, 1955. Fiumara, N. J., and others: Syphilis and Its Management: Present-Day Problem, New England J. Med. **254**:1127-1130 (June 14) 1956; ibid. **254**:1173-1178 (June 21) 1956.

9. Fiumara, N. J., and others: Incidence of Prenatal Syphilis at Boston City Hospital, New England J. Med. **247**:48-52 (July 10) 1952.

## COUNCIL ON DRUGS

Formerly the Council on Pharmacy and Chemistry

### Report to the Council

*The Council has authorized publication of the following report. Nonproprietary terminology is used for all drugs that are mentioned; when such terminology is not considered to be generally well known, its initial appearance is supplemented by parenthetic insertion of names known to be applied to commercial preparations.* H. D. KAUTZ, M.D., *Secretary.*

# CURRENT STATUS OF THERAPY IN THE PNEUMONIAS

Robert Austrian, M.D., Brooklyn, N. Y.

Pneumonia may be caused by a variety of infectious agents: bacteria, viruses, rickettsias, and fungi. In addition, the disorder may be a primary one or may complicate preexisting pulmonary or systemic disease of an infectious or noninfectious nature. Essential, therefore, to the optimum management of pneumonia is knowledge of the etiological agent and of the pathogenesis of the illness to be treated.

### Laboratory Studies

Before treatment is begun, data derived from a complete history and physical examination of the patient should be at hand. In addition to the routine examination of the blood and urine, other laboratory studies, including posteroanterior and lateral roentgenograms of the chest and a culture of the blood and the sputum, should be performed. A study of the sputum is of especial importance, for, when pneumonia is of bacterial or fungal origin, it provides the most ready means of establishing the etiological agent. Sputum should be collected in a sterile glass container and its characteristics noted. Smears stained by the Gram technique should be examined to determine the predominating bacterial forms, and it is often well also to stain smears by a method that will reveal tubercle bacilli. Sputum should be cultured on nutrient blood agar plates, and, if mice are available, one should be injected intraperitoneally with sputum to facilitate the isolation of pneumococci and Friedländer's bacilli.

When pneumonia is not of bacterial or fungal origin, its presumptive etiology can often be established more readily by serologic techniques than by isolation of the causative agent. Therefore, if the cause of pneumonia is obscure, serum should be obtained within 48 hours after the patient is first seen and should be refrigerated under sterile conditions. Seven to 10 days later, a second sample of serum should be collected, and the reaction of the two samples with appropriate antigens should be studied simultaneously. When facilities for the isolation of viruses and rickettsias are available, they should be utilized.

From the Department of Medicine, State University of New York College of Medicine, New York, N. Y.

### Symptomatic Treatment

The treatment of pneumonia may be divided into two categories: symptomatic and specific. Although great emphasis has been placed in the past two decades upon the specific treatment of pneumonia, symptomatic therapy is nonetheless important and may be the only therapy available when specific anti-infectious drugs are lacking. In addition, failure to pay adequate attention to the many possible physiological derangements that often accompany pneumonia may lessen or nullify the benefit derived from the use of specific antibacterial agents.

The patient with pneumonia should be hospitalized unless the illness is mild and conditions for adequate care can be provided in the home. Respiratory isolation should be practiced routinely, at least until the etiology of the illness has been established. Although many forms of pneumonia are characterized by a low degree of contagiousness, others, especially those of viral origin, are transmitted more readily, and unnecessary risks to those persons caring for the patient are to be avoided.

The patient should be placed in bed and, if acutely ill, should be provided with adequate nursing care. The rectal temperature, pulse rate, and respiratory rate should be recorded at 2-hour to 4-hour intervals throughout the day and night. The nurse should be instructed to report promptly to the physician any change in the vital signs, appearance, or behavior of the patient.

The diet should be light and adjusted to the ability of the patient to ingest it. An adequate amount of carbohydrate should be provided to prevent the development of ketosis, but the maintenance of an adequate caloric intake during the acute phase of illness is not a major concern. In the more protracted varieties of pneumonia, such as that caused by the tubercle bacillus, the provision of an adequate nutritional program assumes greater importance.

Fluids sufficient to insure an adequate flow of urine should be given to the patient; usually 2,500 to 3,000 cc. of fluid per day will suffice. When liquids cannot be taken orally, they may be administered parenterally. Isotonic solutions of sodium chloride supplemented with dextrose are usually satisfactory, but,

when cardiac insufficiency complicates pneumonia, salt should be omitted or sharply restricted. Excessive amounts of fluid should not be given because they may lead to the too rapid excretion of specific antibacterial drugs.

Fever is a normal response to infection, and, provided the temperature does not rise above 41.1 C (106 F), it has no untoward effect upon the outcome in uncomplicated pneumococcic pneumonia. Because the antibacterial action of several antibiotics is increased at temperatures above 37 C (98.6 F) and because the temperature curve is one of the most valuable indexes of the success or failure of therapy, attempts to lower the patient's temperature with febrifuges are usually unnecessary and often undesirable. Corticotropin and adrenal steroids should not be employed for their antipyretic effect, for they may interfere with the mobilization of leukocytes at the site of the pulmonary lesion. If lowering the patient's temperature is judged necessary, tepid alcohol sponge baths are the procedure of choice.

Cough is a usual symptom of pneumonia and requires medication only when it becomes unduly harassing to the patient. A dose of 5 mg. of dihydrocodeinone (Dicodid, Dihydrocodeinone) bitartrate given orally, 65 mg. of codeine sulfate, 50 to 100 mg. of meperidine (Demerol) hydrochloride, or 8 mg. of morphine sulfate given orally or hypodermically may be administered at intervals of 4 to 6 hours. It should be remembered that complete suppression of cough is undesirable since it leads to retention of pulmonary secretions.

Thoracic pain, which reflects involvement of the pleural surfaces, is frequently so severe that it interferes with rest and with the normal mechanics of ventilation. Rapid, shallow breathing contributes importantly, in many instances, to the development of cyanosis. Thoracic pain may be alleviated at times by such simple measures as the local application of heat or cold. Limitation of thoracic movement may also be helpful and may be achieved by placing a sandbag against the chest wall or by the application of a taut binder. Strapping with adhesive is undesirable, because it may prove irritating to the skin and it interferes with the examination of the lungs. These physical measures may be supplemented, if necessary, by the administration of such analgesics as codeine or meperidine in the dosages stated above. When immobilization and sedation fail to provide relief from pleural pain, intercostal nerve block with the administration of 1 or 2% procaine solution may be required; however, the need for this procedure is infrequent.

When inability to sleep, restlessness, or delirium occur, the patient may require sedation. Of the many agents available for this purpose, chloral hydrate and paraldehyde are among the more satisfactory. Each may be given orally or rectally in oil. The dose of chloral hydrate is 1 to 2 gm. and of paraldehyde 10 to 15 cc. Barbiturates may be used also, but it should be recalled that they may produce paradoxical excitement in elderly patients. Whiskey in moderation should not be denied the alcoholic patient, especially when pneumonia is complicated by delirium tremens.

In the symptomatic treatment of pneumonia, oxygen is of established value. The principal indication for its administration is cyanosis, although it should be given whenever delirium, severe dyspnea, marked asthenia, or evidences of circulatory derangements are noted. Oxygen in a concentration of 40 to 60% may be administered by means of a face mask, nasal catheter, or tent. Means for ascertaining the concentration of oxygen delivered should be available; adequate precautions against fire should be taken; and an adequate supply of oxygen should always be readily at hand.

Pneumonia may be accompanied by a variety of circulatory disturbances, and, as in any severe intoxication, shock may supervene. In addition to the prompt eradication of the infecting organism whenever possible, other measures may be helpful in the correction of circulatory collapse. When anemia is absent, plasma from one or two donors is the fluid of choice for intravenous infusion, but, when the hemoglobin level is below normal, whole blood should be given. Of the pressor amines, levarterenol (Levophed) is most likely to be of value. It is administered as the bitartrate by intravenous infusion in a concentration of 4 mg. per liter, and the rate of flow is adjusted to the circulatory response. Because levarterenol acts directly on the smooth muscle of vascular walls, it must be administered with adequate precautions to prevent extravasation and local ischemic necrosis. For this reason, it is best given through a plastic catheter inserted through the antecubital vein and passed into the axillary or subclavian vein. Use of the lower extremities for the administration of levarterenol should be avoided whenever possible, especially in the aged.

The use of adrenal steroids to counteract the effects of toxemia upon the circulation involves certain calculated risks. In general, such agents should be used only in overwhelming infections when death appears imminent, when other measures to modify shock have failed, and when control of the infecting organism with antibiotics appears feasible. Doses of 50 to 100 cc. of aqueous adrenal cortex extract or 25 to 50 mg. of hydrocortisone given intravenously every 6 hours may be administered until clinical improvement results.

Digitalis preparations have no part in the routine treatment of pneumonia, and controlled studies have shown that the administration of digitalis in pneumococcic pneumonia results in heightened mortality. When congestive heart failure accompanies pneumonia, however, it should be treated in the usual manner, and, in this situation, digitalis should be given.

Disturbances of gastrointestinal function frequently accompany pneumonia, with such varied manifestations as anorexia, nausea, vomiting, diarrhea, constipation, and paralytic ileus. Acute dilatation of the stomach, which occurs rarely, is a grave complication and should be treated promptly by gastric intubation and aspiration. Because abdominal distention elevates the diaphragm and may increase respiratory embarrassment, it should be prevented or treated promptly when it occurs. An enema of plain soapsuds or one with the addition of 30 cc. of hydrogen peroxide per

liter or 8 cc. of turpentine per liter will often stimulate peristalsis. Enemas should be followed by the insertion of a rectal tube if distention persists. If these measures are ineffectual, 1 mg. of neostigmine methylsulfate may be given intramuscularly.

To prevent the development of decubitus ulcers, the skin should be kept clean and dry at all times. A bed bath should be given daily, and the bed clothing should be changed as often as necessary if the patient perspires profusely or is incontinent of urine or feces. Herpetic lesions about the face are often annoying and may be treated by the application of bland ointments or of compound tincture of benzoin. Local application of antibiotics is unnecessary.

### Treatment for Bacterial Pneumonias

The past two decades have witnessed the development of a number of chemotherapeutic and antibiotic medicaments effective against a variety of the infectious agents that may cause pneumonia. Generally, these drugs exert their inhibitory or lethal effects upon bacteria, though some are effective against rickettsias and certain of the viruses and fungi. Their maximum usefulness in the management of any illness, however, depends upon knowledge of the etiological agent and the proper choice of the drug or drugs most likely to bring about recovery. For this reason, the diagnosis and classification of pneumonia in etiological rather than anatomic terms is preferred.

*Pneumococcic Pneumonia.*—Despite frequent statements to the contrary, pneumococcus remains the most common cause of bacterial pneumonia in the temperate zone, and, if experience in a large city hospital may be taken as representative, the incidence of pneumococcic pneumonia has not declined in recent years. The unavailability of pneumococcic typing serum and the difficulty in identifying the pneumococcus accurately by other bacteriological techniques have been responsible in part for the opinion that pneumococcic disease is less prevalent now than heretofore. The pneumococcus is highly susceptible to the action of a number of antibacterial drugs and, with few exceptions, fails to give rise to mutants resistant to their action. For this reason, drug sensitivity tests with pneumococcus need be performed but rarely. The drug of choice for the treatment of uncomplicated pneumococcic pneumonia is penicillin. As shown in the early clinical studies of this drug, the amount of penicillin required to successfully treat pneumococcic pneumonia is quite small in relation to present-day dosage schedules. When infection is confined to the lung, 300,000 units of potassium or sodium penicillin G or procaine penicillin G given intramuscularly twice daily will provide adequate therapy. When shock is present, water-soluble salts of penicillin G should be given intravenously. In the management of mild and moderately severe infections, limited experience suggests that phenoxymethyl penicillin (penicillin V) (Pen-Vee, V-Cillin) given orally in doses of 400,000 units (0.25 gm.) at intervals of 8 to 12 hours may replace parenteral treatment with injectable penicillin G after an initial dose of the latter has been given.

In the treatment of patients sensitive to penicillin or those in whom the cause of infection is uncertain, other drugs may be used. The tetracyclines, chlortetracycline (Aureomycin), oxytetracycline (Terramycin), and tetracycline (Achromycin, Panmycin, Polycycline, Steclin, Tetrabon, Tetracyn); chloramphenicol (Chloromycetin); and erythromycin (Erythromycin, Ilotycin) are generally as efficient as penicillin in the treatment of pneumococcic pneumonia. Tetracycline hydrochloride or chloramphenicol may be given orally in doses of 0.5 gm. every 6 hours to adults or in comparable amounts by a parenteral route. The dosage of erythromycin is 0.4 gm. every 6 hours.

The use of combinations of antibiotics in treating pneumococcic pneumonia is unnecessary and undesirable, for it not only adds to the cost of treatment but subjects the patient to the increased risk of untoward reactions to medication. Throughout the course of illness, the patient should be observed carefully and examined daily. In the absence of complications, antibacterial therapy should be continued until the temperature has been normal for 72 hours. Failure to improve may result from a variety of causes, among which are extrapulmonary spread of infection to the pleura, joints, pericardium, or meninges; sterile inflammatory pleural effusion; superinfection with a different organism; and the development of hypersensitivity to medication.

*Micrococcic (Staphylococcic) Pneumonia.*—Micrococcic (staphylococcic) pneumonia, which is not a common disorder, is seen most often as an infection of infants, as a complication of infection with the viruses of influenza, and as a form of superinfection during the treatment of pulmonary or extrapulmonary infection with antibiotics. Because most strains of micrococci can give rise to mutants resistant to nearly all the antibiotics currently available, prompt isolation and determination of the sensitivity of a given strain to the drugs of potential value are essential to successful therapy. When such information has been obtained from the laboratory, and, under optimum conditions, it can be had in 36 hours, the patient should be treated with not less than two of the drugs to which the organism is sensitive. Combined therapy tends to lessen the likelihood of survival of micrococcic mutants resistant to any one of the drugs employed, although it does not usually afford absolute protection against such a happening.

When the Micrococcus is sensitive to bactericidal antibiotics such as penicillin, bacitracin, and streptomycin, they are the agents of choice. Penicillin is best used in large doses administered intravenously. Amounts as large as 50 million units or more may be given in 24 hours when the infecting organism is insensitive to its action in vitro in concentrations of less than 25 to 50 units per cubic centimeter. Augmentation of penicillin levels in the body may be achieved by the concomitant administration of the renal tubular blocking agent probenecid (Benemid) in doses of 0.5 gm. every 6 hours. When such large amounts of penicillin are given, the choice of the sodium or potassium salt may be of some importance. Each 10 million units of either of these salts of penicillin G contains the

amount of sodium or potassium equivalent to that in 1 gm. of sodium or potassium chloride. Bacitracin may be given intramuscularly in divided doses of 1,500 to 2,000 units per kilogram of body weight per day. Streptomycins are best administered intramuscularly as streptomycin or dihydrostreptomycin sulfate in dosages of 30 to 50 mg. per kilogram of body weight per day. Both bacitracin and the streptomycins should be administered with caution to patients with impaired renal function.

Among the bacteriostatic drugs, the tetracyclines, chloramphenicol, erythromycin, and novobiocin sodium are of potential value and may be used in combination with one another or with streptomycin and/or bacitracin. The oral dosage of each of these antibiotics is 50 to 75 mg. per kilogram of body weight per day administered in divided doses at 6-hour intervals. Preparations for parenteral use are available also.

It should always be remembered that the choice of therapy in micrococcic infections must be determined for each illness and that effective treatment for one patient may fail to bring about the recovery of another. Inadequate progress toward well-being should always prompt bacteriological reexamination of the sputum during the course of micrococcic pneumonia and modification of therapy in the light of the information so obtained.

*Streptococcic Pneumonia.*—Pneumonia of streptococcic origin is seen infrequently. It may complicate infections of the respiratory tract with the viruses of influenza and the viruses of certain of the exanthems, such as measles. Those infections caused by beta-hemolytic streptococci of Lancefield's group A should be treated in a fashion similar to that employed in pneumococcic pneumonia, except that penicillin should be administered in doses of 300,000 units given parenterally four times a day. Very rarely may infection be caused by nonhemolytic streptococci. Such infections may usually be treated with penicillin alone or supplemented with streptomycin.

*Friedländer's Pneumonia.*—Friedländer's pneumonia, an uncommon infection, occurs most often in males over the age of 30 years and in alcoholics, but it may be encountered in other portions of the population as well. It is caused by encapsulated gram-negative bacilli of the genus Klebsiella and most commonly by types 1 or 2 (Friedländer's bacillus types A or B). Because the acute form of the disease often runs rapidly a fatal course unless effective treatment is instituted within 48 hours after the onset, prompt bacteriological diagnosis is of paramount importance. For this reason, the sputum of a patient with pneumonia should always be examined microscopically after staining by the Gram technique. The presence of large numbers of short, plump, gram-negative rods surrounded by a halo should always prompt a tentative diagnosis of Friedländer's pneumonia.

Like micrococci, strains of Klebsiella vary in their susceptibility to the several antibiotics of potential therapeutic value. For this reason the organism should always be isolated and its sensitivity to drugs tested. Insufficient numbers of patients with Friedländer's pneumonia have been treated with different antibiotics to demonstrate the superiority of one form of therapy over another. Of potential value are the streptomycins, polymyxin B, chloramphenicol, the tetracyclines, and the sulfonamides. Treatment with 1 gm. of chloramphenicol given every 6 hours orally or parenterally and with 1 gm. of streptomycin every 8 hours intramuscularly provides a suitable regimen for initial therapy.

Because pulmonary tuberculosis and Friedländer's pneumonia may coexist in the same patient, it is well to obtain a specimen of sputum for the culture of tubercle bacilli before treatment with streptomycin is initiated. As in micrococcic infections, modification of the therapeutic program may be necessary in the light of laboratory findings. The value of polymyxin B in the management of infections with Klebsiella in man remains largely conjectural, but laboratory data suggest its potential worth. It is administered intramuscularly as the sulfate in dosages of 2.5 mg. per kilogram of body weight per day and should be used with caution in patients with impaired renal function. Patients surviving acute Friedländer's pneumonia may progress to the chronic form of the disease, characterized by pulmonary fibrosis and cavitation, recurring febrile episodes, and the continued expectoration of the causative organism. In the presence of structural changes in the lung, surgery in addition to treatment with antibiotics is usually necessary to effect a cure.

*Bacillary Influenzal Pneumonia.*—The influenza bacillus, Hemophilus influenzae, is a common pathogen in infancy and early childhood but an infrequent cause of human infection after the age of 6 years. It may, however, give rise to pulmonary complications during epidemics of virus infection of the lung in adults, and occasionally it is the cause of sporadic infection. The detection of the influenza bacillus depends upon proper bacteriological techniques, and the organism may be overlooked if human blood is used to enrich mediums for bacterial growth. H. influenzae is susceptible to the inhibitory effects of several antibiotics, including chloramphenicol, the streptomycins, and the tetracyclines. The administration of chloramphenicol alone or in combination with streptomycin in the same dosages recommended for the treatment of Friedländer's pneumonia should provide adequate therapy in most instances. The sensitivity of the causative organism to streptomycin should be determined, since bacterial resistance to it may nullify at times the usefulness of this drug.

*Tularemic Pneumonia.*—Tularemic pneumonia, a serious infection, may be suspected in patients with pneumonia who have had contact with wild rabbits or have been exposed to ticks or deer flies in endemic areas. The presence of a cutaneous ulcer and associated lymphadenopathy points also to the diagnosis, but these indications may be lacking. Disturbances of mental function are often profound in this infection. Isolation of the organism is not without hazard to laboratory personnel, and the diagnosis can be confirmed more safely by serial agglutination tests per-

formed with commercially available antigen. The pneumonic form of tularemia, like other forms of this disease, is amenable to treatment with streptomycin sulfate. In adults, the dosage should be 3 gm. a day given intramuscularly. Tetracycline and chloramphenicol are both of potential value in the management of the disorder, but experience with them in the treatment of tularemia in humans is limited. To lessen the likelihood of emergence of streptomycin-resistant mutants of Pasteurella tularensis, either drug may be used to supplement treatment with streptomycin.

*Pneumonic Plague.*—Pneumonic plague is unknown in the United States at the present time, but sylvatic plague does exist in this country. The diagnosis of plague depends upon awareness that the disease is present and, since the pneumonic form is transmissible directly from man to man, upon knowledge of the patient's exposure to the disease. The causative organism, Pasteurella pestis, may be isolated from the sputum by culture or by inoculation of guinea pigs. Because treatment, to be effective, must be initiated within 20 hours after the onset of the disease, it must be undertaken before laboratory procedures have established the diagnosis. In the treatment of small numbers of patients, streptomycin, chloramphenicol, and oxytetracycline have all proved effective when administered early in the illness. A dose of 1 gm. of chloramphenicol or tetracycline hydrochloride every 6 hours together with 1 gm. of streptomycin sulfate every 6 to 12 hours is recommended. Because of its contagiousness, strict isolation of patients with pneumonic plague is mandatory, and great care must be exercised in the laboratory when working with Past. pestis.

*Tuberculous Pneumonia.*—When confronted with a case of acute pulmonary consolidation, the physician should always be aware that tuberculous pneumonia may mimic disease caused by other organisms. A history of declining health and hemoptysis prior to the onset of acute illness and the appearance of stigmas of tuberculosis elsewhere in the body may point to the diagnosis, although such clues are frequently lacking. It is wise, therefore, to examine the sputum bacteriologically for the presence of tubercle bacilli whenever a patient with pneumonia fails to respond satisfactorily to drugs directed against the putative cause of illness and whenever protracted fever is accompanied by a normal leukocyte count. In the treatment of any acute inflammatory disorder of the lungs, respiratory secretions to be examined for tubercle bacilli should be collected before streptomycin is administered. If tuberculous pneumonia is present, special studies such as tomography, bronchoscopy, and the tuberculin test may aid in establishing the diagnosis.

Treatment must be individualized and requires the use of at least two of the three drugs currently employed in the chemotherapy of tuberculous infection: streptomycin, isoniazid, and aminosalicylic acid. Streptomycin may be given initially as streptoduocin in intramuscular doses of 0.5 gm. twice daily, aminosalicylic acid orally in doses of 12 to 16 gm. a day, and isoniazid orally in doses of 4 to 10 mg. per kilogram of body weight per day. Pyridoxine (vitamin $B_6$) hydrochloride should be given in doses of 25 to 50 mg. per day to prevent the development of neuropathy when larger doses of isoniazid are administered. It should be recalled that isoniazid, like streptomycin, accumulates in the body in the presence of impaired renal function. During the course of treatment, which should rarely, if ever, be less than 6 months, the sputum should be reexamined periodically for tubercle bacilli; if they are isolated, their sensitivity to the drugs being administered should be assayed and the treatment modified if necessary in the light of such studies.

*Pneumonia Caused by Enteric Bacteria.*—Pneumonia is a rare manifestation of infection with Salmonella organisms. Most of the sporadic infections in this country are caused by Salmonella choleraesuis. The disease occurs more frequently in men than in women, and the diagnosis may be made by the isolation of the causative organism from the sputum and blood. The organism is frequently absent from the stool. The infection should be treated with 1 gm. of chloramphenicol given orally or parenterally four times a day.

Pneumonia caused by bacterial species normally resident in the gastrointestinal tract is rarely a primary disorder. It may occur as a terminal event in debilitated persons with other diseases or as a complication of respiratory or nonrespiratory infections treated with antibacterial agents, which suppress the normal flora of the upper respiratory tract, thereby facilitating superinfection. Organisms of the genera Escherichia, Proteus, and Pseudomonas may participate in such infections, and specific treatment must be based upon the sensitivities of the bacteria isolated to the several antibiotics of potential therapeutic value. Very rarely may pneumonia result from infection with obligate anaerobic gram-negative bacilli of the genus Bacteroides. Because of the destructive capabilities of these bacteria, such infections are complicated frequently by pulmonary excavation or empyema. Species of the genus Bacteroides manifest fairly uniform susceptibility to tetracyclines but vary widely in their sensitivity to penicillin and streptomycin. For this reason, treatment of pneumonia caused by these organisms is accomplished most satisfactorily with full dosages of a tetracycline.

### Treatment for Viral Pneumonias

The viral pneumonias, like those of bacterial origin, are a heterogeneous group and do not comprise, therefore, a single disease entity. Pneumonitis may result from infection with viruses of the psittacosis-ornithosis group, with those of influenza A and B, with several members of the adenovirus (APC-RI) group, with Eaton's virus of primary atypical pneumonia associated with the formation of cold hemagglutinins, and with viruses of certain of the exanthems of childhood.

With the advent of the sulfonamides and the recognition that certain respiratory infections were insusceptible to their action, interest in nonbacterial pneumonia was aroused. This interest was heightened during World War II by the occurrence of epidemics in military and civilian populations of nonbacterial pneumo-

nia of apparent viral origin associated often with the appearance of cold hemagglutinins. Since the cessation of hostilities and the decline in shifts of population, the incidence of such outbreaks of pneumonia has lessened and is confined largely to such closed population groups as those found in schools and military installations. Investigations of the cause of such infections have continued, however, and, with the introduction of new techniques for the isolation and propagation of viruses, several such causative agents have been defined. As a result of these and of clinical studies, it appears doubtful that any of the pneumonias of viral origin are amenable to therapy other than symptomatic therapy, with the exception of infections caused by viruses of the psittacosis-ornithosis group.

Whenever it has been possible to identify the causative agent of a viral pneumonia (with the aforementioned exception), no effect in vitro or in vivo has been observed to follow the use of antibiotic drugs. Although there are several reports of seemingly beneficial effects after administration of tetracyclines, their value remains in doubt. In the few studies of large numbers of patients that have been controlled adequately, no effect has been demonstrable in those treated with this group of antibiotics. Because the mortality is low in most pneumonias of viral origin and because specific therapy is lacking for most such infections, symptomatic treatment is the procedure of choice. When life appears to be in jeopardy, the use of a tetracycline may be justifiable in the hope that the etiological agent, if undefined, may be susceptible to its action. The value of antibiotics in preventing the superimposition of bacterial infection in viral pneumonia is problematical.

Infection with a virus of the psittacosis-ornithosis group may be suspected whenever the patient with pneumonia has had contact with any of a wide variety of avian species. The etiological diagnosis may be established definitely by the isolation of the causative agent or presumptively by serologic tests. Such infection is amenable to therapy with drugs of the tetracycline group, and one of them should be employed in full therapeutic amounts. The dosage for adults of either chlortetracycline, oxytetracycline, or tetracycline (usually given as the hydrochloride) should be 0.5 to 1 gm. given every 6 hours orally, or 2 gm. a day given parenterally.

### Treatment for Pneumonia of Rickettsial Origin

Q fever, a rickettsial disease caused by Coxiella burnetti, is seen most commonly in persons having contact with infected cattle or the products of animal husbandry and in laboratory personnel working with the organism who are infected accidentally. Because C. burnetti may survive in milk subjected to pasteurization, the disease may occur also in milk drinkers. Pulmonary infiltration is a frequent manifestation of Q fever, and the disorder may be indistinguishable clinically from viral pneumonia. The diagnosis may be established by the isolation of C. burnetti from the blood or by serologic techniques. In addition to benefiting from symptomatic treatment, patients with Q fever may manifest clinical improvement after treatment with a tetracycline. The tetracyclines are not directly rickettsiocidal in this infection, for organisms may be recovered from the blood of patients with demonstrable levels of the drug in the circulation. A significant proportion of patients so treated, however, may experience a more prompt return to well-being than those who are not.

### Treatment for Pneumonias of Fungal Origin

A variety of fungi may give rise to primary acute pulmonary inflammation, and several may be associated with the phenomenon of superinfection. In the former category are Histoplasma capsulatum, Coccidioides immitis, and Blastomyces dermatitidis, and among the latter are species of Aspergillus and Candida (monilia). Pulmonary infections with other species of fungi, such as Actinomyces and Cryptococcus, give rise more commonly to chronic disease, often insidious in onset, resembling chronic pulmonary tuberculosis in its course. Recognition of pneumonias of fungal origin requires knowledge of the geographical areas in which they are endemic and of the occupations with which they are associated. Special cultural techniques are required for the isolation of many organisms in this group.

Specific therapy is lacking for the treatment of histoplasmosis, coccidioidomycosis, and aspergillosis. The stilbamidines, of which hydroxystilbamidine isethionate is the drug of choice, may exert a beneficial effect in the treatment of blastomycosis. Because of their toxicity and instability, the stilbamidines must be administered with due precautions. Pulmonary moniliasis may be suppressed by nystatin (Mycostatin) in oral doses of 500,000 units daily, though definitive cure may be difficult to effect. The concomitant administration of potassium iodide is of uncertain value.

### Summary

It is evident that acute primary infection of the lungs may be caused by a wide variety of parasites. For the treatment of certain of these infections, specific drugs are available; but, for others, reliance must be placed on symptomatic therapy. In every instance, an attempt should be made to establish the etiology of pneumonia in order that decisions regarding the use and choice of specific therapeutic agents may be made on a rational basis. It should be remembered also that pneumonia may complicate other pulmonary disorders, such as tumor, infarct, or abscess of the lung, and that recurrence of pneumonia in the same pulmonary segment should always suggest a persisting local anatomic abnormality. Only by combining complete anamnesis and examination with intelligent use of the laboratory can optimum results be obtained in the management of pneumonia.

THE JOURNAL
OF THE AMERICAN MEDICAL ASSOCIATION

*Edited Under the Direction of the Board of Trustees*

*Editor and Managing Publisher* . . AUSTIN SMITH, M.D.
*Associate Editor* . . . . . JOHNSON F. HAMMOND, M.D.
*Assistant Editors* . . . . . WAYNE G. BRANDSTADT, M.D.
FREDERIC T. JUNG, M.D.
EDWARD R. PINCKNEY, M.D.
*Assistant to the Editor* . . . . . MILTON GOLIN
*Editor for Medical Literature Abstracts* . . GEORGE HALPERIN, M.D.

Subscription price . . Fifteen dollars per annum in advance
Cable Address . . . . . "Medic, Chicago"

## BIOLOGICALLY FALSE-POSITIVE SEROLOGIC REACTIONS

GUEST EDITORIAL

**Charles R. Rein, M.D.**
and
**Louise C. Kelcec, M.T., New York**

For many years physicians have been confronted with the problem of how to evaluate or interpret serologic reports obtained from the laboratory in determining the presence or absence of a syphilitic infection. Most physicians have encountered nonsyphilitic patients with unexplained positive serologic reactions.

While it is true that most positive serologic results are due to syphilis and perhaps represent a type of immunological reaction, it is no less true that some positive serologic results may be unrelated to syphilis and represent a general biological phenomenon. Many persons, therefore, have been stigmatized as having syphilis and even given unnecessary treatment on the basis of positive reactions disclosed by routine serologic examinations. With a continued decrease in the incidence of syphilis, there will be a relative increase of the biologically false-positive reactions. In fact, there is rapidly accumulating evidence [1] that about 40% of the white persons in upper socioeconomic and educational levels who are discovered to have positive standard serologic tests for syphilis in the absence of any clinical or anamnestic evidence of syphilis or in the absence of reasonable opportunity for infection do not have syphilis and gave biologically false-positive reactions.

Moore and Mohr [1] have advanced the concept that there are two types of biologically false-positive reactions, the "acute" and the "chronic." The former are associated mostly with acute infections of varying etiology with a short course and disappear spontaneously within six months of their appearance. It is estimated that about 20% of the normal adult population may be potential acute biologically false-positive reactors under the appropriate infectious stimulus. The chronic biologically false-positive reaction is characterized by the persistence of the positive serologic test over a long period of time, perhaps for life. These reactions are probably due to the presence of antibody-like substances or to other nonimmunological alterations in the globulin fractions of the serum. Stokes,[2] in 1934, enumerated about 30 conditions that render frequent, occasional, or disputed biologically false-positive serologic reactions, but numerous recent reports have disclosed still other diseases and conditions that may cause biologically false-positive reactions. In fact, any metabolic disturbance or febrile episode may at times influence the reliability of serodiagnostic tests for syphilis.

Within the past two years reports have appeared in the literature describing a most unusual type of reaction complicating the prolonged use of hydralazine hydrochloride, known commercially as Apresoline, a hypotensive agent used in the management of essential hypertension. This reaction, which is referred to as the hydralazine syndrome, is characterized by fever; prostration; pleural, pericardial, and joint effusions; and cutaneous eruptions resembling those of systemic lupus erythematosus. In addition, some of these patients develop false-positive serologic tests for syphilis and L. E. cells in the peripheral blood and bone marrow. Histologically, abnormal collagen has been found in muscle and skin. This syndrome has been reported in approximately 10% of patients who received an average of 600 mg. or more of hydralazine hydrochloride daily over prolonged periods averaging 12 months. In most patients the syndrome is first noticed when the diastolic pressure falls to 90 mm. Hg, and in some instances it definitely appears to be precipitated by an intercurrent infection. This syndrome may prove of great interest to dermatologists, because it may be an investigative tool that may shed some light on the pathogenesis of systemic lupus erythematosus and on its obscure etiology.

It has become quite evident that the chronic biologically false-positive reaction represents an important and potentially serious medical problem, since many nonsyphilitic patients with positive reactions on serologic tests already have or may develop generalized systemic vascular diseases. The difficulties of basing a diagnosis of syphilis on standard serodiagnostic tests alone are known.

Many investigators had advanced the theory that a specific antibody produced against virulent Treponema pallidum is present in the serum of patients with syphilis, but this could not be established, because it was impossible to keep the treponemes alive in vitro for an appreciable length of time. In 1947, Nelson, while attempting to culture T. pallidum in vitro, discovered the immobilizing antibody. With the development of the T. pallidum immobilization (TPI) test there became available a specific serologic procedure by which it became possible to differentiate the biologically false-positive reaction from that occurring in syphilis. With the subsequent development of the newer T. pallidum immune adherence (TPIA), T. pallidum agglutination (TPA), and T. pallidum complement-fixation (TPCF) tests, many laboratories may find it practical and feasible to perform a specific procedure of this type. These newer tests have obvious advantages over the Treponema im-

From the Department of Dermatology and Syphilology of the New York University Post-Graduate Medical School (Dr. Marion B. Sulzberger, Chairman) and the Skin and Cancer Unit of the University Hospital.

1. Moore, J. E., and Mohr, C. F.: Biologically False Positive Serologic Tests for Syphilis: Type, Incidence, and Cause J. A. M. A. **150**:467-473 (Oct. 4) 1952.

2. Stokes, J. H.: Modern Clinical Syphilology: Diagnosis, Treatment, Case Studies, ed. 2, Philadelphia, W. B. Saunders Company, 1934, p. 131.

mobilization procedure in that killed treponemes or extracts thereof are used as antigens, which may be stored under refrigeration and be made available to smaller serologic laboratories that do not have adequate facilities to cope with the technically more complicated immobilization test.

After the adequate treatment of patients with primary or secondary syphilis, the standard serologic tests may become negative months, and even years, before the treponemal tests revert to seronegativity. In a recent report it was noted that the treponemal tests were still reactive for as long as eight years after completion of adequate penicillin therapy, even though a battery of routine serologic tests was completely negative.

The U. S. Public Health Service in cooperation with us has designed a national serologic survey that should prove to be of tremendous value in establishing the relative sensitivity, specificity, and reliability of these new treponemal procedures. This survey is now under way.

Some laboratories feel that they may soon discard the performance of the routine standard serologic tests. It is generally accepted, however, that this is neither feasible nor advisable at this time. The present serologic tests have attained a high degree of sensitivity and specificity, even though the antigens employed are not specific in the true biological sense. The standard serologic tests seem yet unchallenged as the most effective device in screening for syphilis. Furthermore, by means of these routine serologic tests, it is often possible to detect the biologically false-positive reactors long before the individual has developed the clinical manifestations of the disease responsible for such a reaction. This is especially true of lupus erythematosus and rheumatoid arthritis, in which the patient may have positive serologic tests for one or more years prior to the development of clinically recognizable evidence of the disease.

All patients in either private or clinic practice should be subjected to an examination with the standard serologic tests for syphilis. Those seropositive reactors who present no clinical or anamnestic evidence of treponemal disease should then be retested with one or more of the specific serodiagnostic procedures employing antigens of T. pallidum. A final diagnosis of treponemal disease, past or present, should not be made in persons with seropositive reactions unless it is confirmed by clinical or historical evidence and/or by a test capable of demonstrating specific treponemal antibodies.

## MANY COOKS CAN MAKE A BETTER BROTH

Medicine seems to be one of the few instances in which you cannot apply the old adage, "Too many cooks spoil the broth." The medical profession welcomes all, and is willing to share with all, who in any way join in the struggle to improve the nation's health. Organized medicine is certainly not reluctant to admit that it needs expert assistance in all allied fields to achieve the goal of physical, mental, and social well-being of all the people.

One of the many professional branches contributing to healthier living is the official public health agency. The fact that the American Public Health Association in its special task force report [1] professes the same aims as organized medicine should dispel any implication that there is an apparent abyss between these two branches of the same profession. To be sure, the methods used by the two related fields to attain their mutual goal cannot help but be different: The family doctor treats the individual directly, while the public health worker treats the individual indirectly, as a part of protecting the entire community.

The task force report defines public health practice as the application of medical, social, and allied principles in an organized community activity. It goes on to say, "In a democratic society an individual will always retain primary responsibility for his own health and that of his family. A major task of Public Health is to increase the competence of individuals, families, and communities to cope with their own health problems." In this activity of educating the community to seek and actually take advantage of competent medical care before chronicity occurs, public health has the hearty support of practicing doctors.

Another interesting aspect of the report points out the activities of public health agencies to be participation rather than strictly formulation and singular implementation. "More than ever before the efforts of Public Health and private medicine are inter-dependent. There is need for major reorientation of both groups." Just one example that the medical profession is willing to be reoriented concerning public health can be seen in its wholehearted support of the formation of the American Association of Public Health Physicians.

It is also encouraging that the American Public Health Association task force, in its desire to open more channels of cooperation between public health and the American Medical Association, specifically says that these channels of cooperation should not depend upon personalities but rather should be a part of each association's fixed organizational structure. The goal of better health can be achieved more easily with joint planning; but, of even greater importance, joint planning must include mutual respect and understanding of the function each party is prepared to perform.

The field of public health is primarily an administrative one, especially when compared with private practice, which provides personal service directly to the patient. Prevention of illness by safeguarding the community environment is probably the most important administrative duty in the public health field. Preventive medicine becomes a reciprocal science when those who care for the community and those who care for the individuals work hand in hand. It has been demonstrated all too often that when either profession diverges from its familiar skills the end-result is lack of quality services.

The "broth" of good health for all will require long cooking, and probably tedious stirring. While it is agreed that a good soup cannot be hurried, many hands working together cooperatively can see to it that good health for all is constantly tended to, and furthermore will result in its being "well done."

1. Report of American Public Health Association Task Force, Arden House Conference, October 12-15, 1956, Am. J. Pub. Health 47:218-234 (Feb.) 1957.

## THE NEW YORK SESQUICENTENNIAL

One hundred fifty years ago the Medical Society of the State of New York was organized, and to celebrate that memorable event a special program was presented during the annual meeting of the society in New York City last month. To allow members and others more freedom to enjoy this occasion, there were no formal meetings of the scientific sections (except the business meetings) and no meetings of the house of delegates. The program was comprised largely of general sessions and symposiums and panel discussions. There was also an almost continuous showing of medical motion pictures, some of which were new, and a color television program. A number of guests from medical centers in other states were invited to participate in the program. There was a public luncheon at which noted speakers representing the three principal faiths discussed the interrelations of religion and medicine; a public forum on medical care participated in by spokesmen of labor, management, and the medical profession; and an exposition of the history of medicine in the Empire State. County medical societies, medical schools, libraries, hospitals, academies, and other organizations prepared exhibits. The Medical Society of the County of Kings displayed an original copy of a book by George Washington's physician on the treatment of wounds. The surgical instruments used at the autopsy on President Abraham Lincoln were exhibited. A highlight among the social events was the sesquicentennial banquet at the Waldorf Astoria on Tuesday evening.

The magnificent February 1 issue of the *New York State Journal of Medicine*, which also celebrates the sesquicentennial, is the largest issue of this journal ever published. It contains such unusual sections as a history of the Medical Society of the State of New York, presented in three parts by different authors and entitled "The First Seventy-Five Years," "The Years Between 1882-1906," and "The Last Fifty Years." These sections are enhanced by numerous pictures of individuals and medical institutions. In the first historical section is an account of the meeting in 1846 of the National Medical Convention, out of which, a year later, developed the organization of the American Medical Association. Here, naturally, is a picture of Dr. N. S. Davis, the founder of the American Medical Association, who originally was from the state of New York.

This issue of the *New York State Journal of Medicine* contains also a history of the New York State Department of Health and of the New York State Department of Mental Hygiene, a symposium on the development of medical education in New York City; papers on the medical libraries of New York State, the development of voluntary nonprofit medical care insurance plans, practitioners of folk medicine, physical medicine and rehabilitation at midcentury; and an annotated bibliography of the history of medicine in New York. Published for the first time is the diary of Dr. Henry D. Didama, president of the New York State Society of Medicine in 1879, written during the period of his student and preceptor days.

The gathering and sifting of this material was a monumental task for which the editor gives due credit to many physicians, librarians, historical societies, and others, without whose help this issue could not have been published. All persons interested in medical history and medical organizations will enjoy fully the sesquicentennial number of the *New York State Journal of Medicine*.

## WHAT "PEOPLE TO PEOPLE" MEANS

If anyone can fully appreciate the great warmth of interpersonal rapport—and the icy void created by impersonality—he is the private practitioner. To him, the oft-cited "physician-patient relationship" means much more than mere contact of medicine with the individual. It is a sacrament that interrelates the science of medicine with the art of medicine; it is harmonious dynamism in human relations.

For this reason, President Eisenhower's appeal last fall to the medical profession to help effect a "people-to-people" friendship program strikes a particularly welcome challenge to doctors everywhere. It identifies international relations with the long-time basic concepts of good medical practice. Said the President: "If our American ideology is eventually to win out in the great struggle being waged between the two opposing ways of life, it must have the active support of thousands of independent private groups and institutions and of millions of individual Americans acting through person-to-person communication in foreign lands."

The secretary general of the World Medical Association, Dr. Louis H. Bauer, who heads a committee to coordinate the health professions in President Eisenhower's program, has reported substantial initial progress. Five specific programs now are being promoted by the committee. From the viewpoint of American participation, the aims call for (1) fulfilling specific requests of foreign health groups for professional and technical data, audiovisual materials, and equipment; (2) encouraging private resources to help improve public health situations through informational materials; (3) planning special hospitality programs for foreign colleagues on visits to this country; (4) stressing the desire of the United States to share its scientific progress by presenting new techniques during visits to hospitals and clinics abroad; and (5) widening participation in international meetings so that American speakers on scientific topics can also project the objectives of people-to-people partnership.

American medicine is not so presumptuous as to suppose that physicians alone can achieve better understanding with persons in health fields throughout the free world. And so representatives of the nursing, dental, hospital, veterinary, and pharmaceutical professions are playing equally active roles in committee planning. The committee hopes to make all members of the health professions individual ambassadors of peace. Already it is helping find opportunities to place Hungarian refugees who are qualified in the physician and nursing fields. The American Medical Association gave full support to the people-to-people program last November when the House of Delegates voted unanimously to "join wholeheartedly in an outpouring of neighborliness to make America's peaceful intentions and our democratic ideals understood."

# ORGANIZATION SECTION

## MEDICARE

*The following bulletin was released from the office of Secretary George F. Lull for distribution to constituent state and territorial medical associations.*—ED.

### Introduction

This is the first of a series of Bulletins since the conclusion of the Medicare contracts to be prepared and distributed to the constituent medical associations under the auspices of the Hamilton Task Force on Medicare of the American Medical Association Board of Trustees. The Task Force consists of Dr. Hugh H. Hussey, Dr. Joseph D. McCarthy, Dr. James R. Reuling and Dr. Edwin S. Hamilton, Chairman.

The Task Force, at a meeting in Washington, D. C., February 25-26, decided that close contact with the Medicare program is desirable. The Washington Office will maintain day-by-day liaison with Major General Paul I. Robinson, Executive Director, Office for Dependents' Medical Care, and members of his staff. The Task Force, on the basis of information available to it from the Army, the Washington Office and from the contracting and fiscal agents will sponsor a periodic Medicare Bulletin which will be prepared by and distributed from the Chicago office.

For administrative purposes the Medicare informational center of the American Medical Association will be located in the office of the Council on Medical Service, George Cooley, Acting Secretary, 535 North Dearborn Street, Chicago 10.

A copy of this Bulletin is enclosed for transmittal to your fiscal agent if you desire. Additional copies are available on request.

### Meeting of Hamilton Task Force

On February 25 the Hamilton Task Force, technical consultants (Mr. S. A. Hildebrand, Mr. George P. Farrell, Mr. R. W. Lyon, Mr. James A. Waggener and Mr. John Steen) and members of the A. M. A. staff met to review the status of the Medicare program and to establish appropriate liaison channels and responsibilities. Following this meeting the entire group met with Major General Paul I. Robinson, members of his staff and liaison representatives of the Department of Health, Education and Welfare and the Defense Department. At this meeting General Robinson presented information concerning the operation of the program. This Medicare Bulletin is devoted primarily to a summary of the information presented.

### State Participation

All constitutent associations are participating contracturally in the program with the exceptions of Rhode Island, where the Army is paying doctors directly, and Ohio, where the Army has contracted with an insurance company to handle billings and collections. Effective April 1, an arrangement similar to that in Ohio will be in operation in Rhode Island.

### Number of Claims

Up to the date of the February 26 meeting the Army, acting for all uniformed services, received 4,407 physicians' claims from 27 states for a total of $316,275. Of these claims, 25.5 per cent are for Army dependents, 30.1 per cent for Navy, 41.7 per cent for Air Force, and 2.7 per cent for Public Health Service.

For the first 2,507 hospital claims $213,630 has been paid. The hospital claims are divided approximately as follows: 23.6 per cent for Army dependents, 38 per cent for Navy, 35.8 per cent for Air Force and 2.6 per cent for Public Health Service.

### Types of Care on Basis of Claims

A survey of 1,000 medical and surgical claims from seven states shows 22½ per cent for physicians' home, hospital and office calls; 37.4 per cent for deliveries and infant care; 11.9 per cent for gynecologic procedures; 17.5 per cent for tonsillectomies, 1.8 per cent for appendectomies and 8.9 per cent for other classifications.

Eighty-four per cent of these claims were for female dependents.

### Non-Existence of Abuse

The Executive Director, Office for Dependents' Medical Care, reported that there had been almost no apparent evidence of overcharging or abuse by physicians, or of fraud on the part of dependents. He indicated that he was delighted with the cooperation he had received from the American Medical Association, the constituent associations and the fiscal agents. Moreover he had absolutely no criticism regarding quality of care.

### Special Problems

General Robinson's office is experiencing difficulty in administering that portion of the program relating to acute emotional disorders. Medical and hospital care are authorized for acute but not for chronic cases. The problem is to determine when the patient passes from the acute stage to chronicity, as well as the question of transfer to an appropriate facility. A special meeting was scheduled by the Army for February 27 to discuss this difficult question.

Other administrative problems which have confronted the Department are related to chronic illness, elective surgery, dental care, small hospitals ineligible for participation under the present definition of "hospital," and readmission to hospitals after discharge. An extensive correspondence has already been developed on many facets of the program. Obviously Medicare is in a transition stage. Experience will indicate various changes not now foreseen.

Approximately 50 per cent of all claim forms have had to be returned to their source due to the absence of necessary data. Some of this is undoubtedly due

to ambiguities in the form. Simplification of the form is now being considered. It is possible that three different claim forms, one for hospitals, another for obstetrics and a third for all other medical and surgical cases, may be developed.

### Pressures for Expansion

Suggestions have been made for liberalization of the program to include outpatient care; drugs; infant care for a period of one year; expanded medical care benefit provisions in physicians' offices, and many others. General Robinson indicated that his office has no plans for recommending major changes in the Medicare program—certainly not until more experience has been accumulated within the present program limits.

The most important change made thus far in the Medicare program is the extension of compensable nursing services from registered nurses to practical nurses. The necessity for such care must be certified by the attending physician. The patient pays the first $100 of the cost of such care and 25 per cent of charges in excess of $100.

### Termination of Government Responsibility

An early task of the Army was to develop a method for terminating government responsibility when the sponsor of a dependent leaves the uniformed service. This procedure has been adopted: It is the commanding officer's responsibility when a man is leaving service to ascertain whether he has a dependent hospitalized in civilian facilities. If hospitalization is involved, the commanding officer immediately wires the information to General Robinson's office. That office then wires the fiscal agents in the state where the hospital is located. Twenty-four hours after word has been sent to the state fiscal agents (excepting Saturdays, Sundays and holidays) the federal government's liability for payment ceases.

### New Identification Card

A new identification card now being developed will be used for commissaries and all other privileges, including Medicare. These cards will be issued about July 1, by which time, General Robinson estimates, about 2,000,000 dependents will be listed as entitled to care in civilian facilities.

### Renegotiation

The Army plans to approve extension of the present contracts in their existing form beyond June 30 and to complete this extension by correspondence. Renegotiation of new contrats will begin in January 1958 and continue throughout the calendar year, five states being renegotiated each month. A list of tentative dates for each state is attached. It is the opinion of our Law Department that it would be wise for the states to ascertain clearly what administrative expenses the Army is willing to underwrite before renegotiation occurs. Any policy questions, in fact, concerning the present fiscal arrangements of the program should be resolved before attempting to negotiate a new contract.

### New Publications

Enclosed for your information is a copy of AR 40-121 (Medical Service, Dependents' Medical Care) and DOD Pam 6-4 (Medical Care for Service Dependents).

### Summary

The Medicare program is in operation. Dependents are receiving medical and hospital care and physicians and hospitals are being remunerated by fiscal agents on behalf of the federal government.

Renegotiation of new contracts will be carried out in 1958 when the constituent associations, fiscal agents and the Army have had sufficient experience to renegotiate intelligently.

Every effort will be made to maintain close liaison between General Robinson's office and the American Medical Association. A center for receipt and dissemination of information and periodic Medicare bulletins under the direction of the Hamilton Task Force has been established in the office of the Council on Medical Service.

*Tentative Department of the Army Schedule for Renegotiating Medicare Contracts*

| January 1958 | February 1958 | March 1958 |
|---|---|---|
| Texas | California | New Mexico |
| Wisconsin | Idaho | Indiana |
| North Dakota | Mississippi | Hawaii |
| Arkansas | Arizona | Puerto Rico |
| Alaska | Georgia | Rhode Island |
| **April 1958** | **May 1958** | **June 1958** |
| Delaware | Alabama | Blue Cross |
| Florida | South Dakota | Mutual of Omaha |
| Nevada | Connecticut | Ohio |
| Idaho | Vermont | Maine |
| Minnesota | New Hampshire | New Jersey |
| **July 1958** | **August 1958** | **September 1958** |
| District of Columbia | Louisiana | Missouri (Kansas City) |
| Illinois | Maryland | Missouri (St. Louis) |
| Kansas | Massachusetts | Nebraska |
| Kentucky | Michigan | North Carolina |
| New York | Montana | Washington |
| **October 1958** | **November 1958** | |
| Oklahoma | Tennessee | |
| Oregon | Utah | |
| Pennsylvania | Virginia | |
| Colorado | West Virginia | |
| South Carolina | Wyoming | |

## PRESIDENT MURRAY ON FAR EAST TOUR

A. M. A. President Dwight H. Murray and Dr. Leo H. Bartemeier, medical director, Seton Institute, Baltimore, departed from San Francisco, March 2, on a tour of naval medical facilities in the Pacific and Far East. The tour, by invitation of Rear Adm. Bartholomew W. Hogan, surgeon general of the Navy, is designed to make civilian medical educators and specialists aware of the high standards of medical care rendered by the Navy Medical Department, to assist Navy medical officers in keeping abreast of recent advances in medicine, and for morale purposes.

Drs. Murray and Bartemeier will visit the patients in various facilities and lecture before staff personnel and other physicians and dignitaries invited to attend. Arrangements have been made also for lectures before the medical associations of Japan and the Philippines.

Rear Adm. Thomas H. Hays, M. C., fleet medical officer, commander-in-chief, Pacific Fleet, and his administrative aide, Commander Erwin W. White, M. S. C., U. S. Navy, are accompanying Drs. Murray and Bartemeier on the tour. The party is expected to return to San Francisco on or about March 28.

# COUNCIL ON NATIONAL DEFENSE

## RESULTS OF A SURVEY OF PHYSICIANS SEPARATED FROM ACTIVE MILITARY SERVICE

Since 1952, the Council on National Defense has conducted an opinion survey among physicians being released from active military service. The questionnaire utilized in the survey is primarily designed to obtain pertinent data based upon the physician's observations and opinions, while in the armed forces, concerning the utilization of physicians and the medical staffing conditions in the uniformed services.

The results of this continuing survey are periodically reported in THE JOURNAL. The questionnaire also calls for comments and suggestions of ways to further improve the medical corps as well as means whereby organized medicine can be of greater assistance to military physicians. Consequently, the results of the survey serve as a basis for recommendations and conferences with representatives of the military establishments.

TABLE 1.—*Medical Staffing Conditions in the Armed Forces*

| | Nurses, % | Enlisted Medical Personnel, % | Physicians, % | Dentists, % | Others, % | Total, % |
|---|---|---|---|---|---|---|
| Army | | | | | | |
| Overstaffed ..... | 6.0 | 18.5 | 24.0 | 20.3 | 33.9 | 18.1 |
| Understaffed .... | 38.3 | 17.4 | 28.2 | 24.4 | 33.1 | 27.0 |
| Adequate ..... | 55.7 | 64.1* | 47.8 | 55.3 | 33.0* | 54.9 |
| Total ..... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Navy | | | | | | |
| Overstaffed ..... | 7.9 | 19.0 | 35.9 | 14.8 | 27.4 | 20.3 |
| Understaffed ... | 23.4 | 19.2 | 18.9 | 24.0 | 35.6 | 21.7 |
| Adequate ..... | 68.7* | 61.8 | 45.2 | 61.2 | 37.0 | 58.0 |
| Total ..... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Air Force | | | | | | |
| Overstaffed ..... | 8.4 | 15.3 | 22.7 | 21.9 | 19.8 | 17.2 |
| Understaffed ... | 40.5 | 33.5 | 33.6 | 21.2 | 55.9 | 33.3 |
| Adequate ..... | 51.1 | 51.2* | 43.7 | 56.9 | 24.3 | 49.5 |
| Total ..... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

* Forced to total 100%.

The following report covers the period Jan. 1, 1955, to Dec. 31, 1955. During that period, the Council sent out 3,651 questionnaire forms and, of these, 2,191 completed ones were returned, representing a 60% response.

### Physicians' Evaluation of Staffing Conditions

One of the questions was designed to obtain the opinion of physicians as to staffing conditions of nurses, enlisted medical personnel, physicians, dentists, and others at those units where the physician served. The tabulation of this multiple-answer question indicated that in the Army replies of overstaffing totaled 660, understaffing 985, and adequate staffing 2,005. In the Navy, replies of overstaffing totaled 400, understaffing 429, and adequate staffing 1,146. The Air Force tabulation revealed 459 replies of overstaffing, 892 of understaffing, and 1,324 of adequate staffing. Table 1 reflects, in detail, the percentages relative to replies of overstaffing, understaffing, and adequate staffing conditions in the three military services.

### Distribution of Physicians by Rank at Time of Discharge

The majority of physicians in the Army and Air Force held the rank of captain at the time of their release from active military duty. However, in the Navy at the time of separation, the majority was in the lowest rank of lieutenant junior grade. Over 97% of the reporting physicians or 2,135 answered this question. The survey indicated that approximately 27% of those who reported were in the lowest rank, while 64% held the rank of captain or lieutenant senior grade. There were approximately 7% with the rank of major or lieutenant commander and higher. Table 2 indicates the number and percentages by rank within the three services.

TABLE 2.—*Distribution of Physicians by Rank at Time of Discharge*

| | Army | | Navy | | Air Force | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| 1st lieut.—lieut. j.g. ..... | 245 | 26.0 | 335 | 63.4 | 18 | 2.0 |
| Capt.—lieut. s.g. ..... | 648 | 68.8 | 114 | 21.6 | 634 | 95.3 |
| Major—lieut. commander .... | 36 | 3.8 | 77 | 14.6 | 12 | 1.8 |
| Lieut. col.—commander ..... | 10 | 1.1 | 2 | 0.4 | 5 | 0.8 |
| Col.—capt. ..... | 3 | 0.3 | 0 | 0.0 | 1 | 0.1 |
| Total ..... | 942 | 100.0 | 528 | 100.0 | 665 | 100.0 |

### Number of Years Since Graduation

About half of the physicians replying (1,108 or 50.5%) were graduated from medical school between the years 1945-1949; the second largest group, 503 or 23%, graduated in 1950 or later. There were 449 or 20.5% graduating between the years 1940-1944. Less than 2% graduated before 1940. There were 89 who failed to indicate the year of graduation from medical school (table 3).

TABLE 3.—*Distribution of Physicians Graduated from Medical Schools in Selected Intervals*

| | No. | % |
|---|---|---|
| Before 1940 ..... | 42 | 1.9 |
| 1940-1944 ..... | 449 | 20.5 |
| 1945-1949 ..... | 1108 | 50.5* |
| 1950 and over..... | 503 | 23.0 |
| Unknown ..... | 89 | 4.1 |
| Total ..... | 2191 | 100.0 |

* Forced to total 100%.

### Years of Residency Training

As was the case in the last summary report covering the last six months of 1954 (THE JOURNAL, Nov. 26, 1955, page 1306), the largest group replying to this question (497 or 22.7%) completed three years of residency training while the second largest group (450 or 20.5%) had no residency training at the time of entrance on active duty. There were 369 or 16.9% with one year of residency training; 347 or 15.8% with two years; and 268 or 12.2% with four years. Those who failed to answer this question totaled 260 (table 4).

### Occupation at Time of Entering Service

The largest groups of physicians who served in the Army and Air Force were engaged in general practice at time of entrance on active military duty, while the largest group in the Navy were in residency training.

TABLE 4.—*Distribution of Total Physicians by Years of Residency*

| | No. | % |
|---|---|---|
| None | 450 | 20.5 |
| 1 | 369 | 16.9* |
| 2 | 347 | 15.8 |
| 3 | 497 | 22.7 |
| 4 | 268 | 12.2 |
| No response | 260 | 11.9 |
| Total | 2191 | 100.0 |

* Forced to total 100%.

The last summary report reflected the largest groups in all three services were engaged in residency training prior to active military service. In the Army group, general practice was second while in the Navy specialty or industrial practice and in the Air Force residency training were ranked second. Table 5 indicates the percentage distribution, by services, according to type of practice at time of entering military service.

TABLE 5.—*Percentage Distribution of Physicians According to Type of Practice at Time of Entering Military Service*

| | Army, % | Navy, % | Air Force, % |
|---|---|---|---|
| Internship | 5.4* | 11.9 | 10.3 |
| Residency | 25.3 | 25.8 | 28.3 |
| General practice | 28.2 | 23.4 | 31.6 |
| Specialty practice / Industrial practice | 28.7 | 25.3 | 21.1 |
| Other | 12.3 | 13.6 | 8.7 |
| No response | 0.1 | 0.0 | 0.0 |
| Total | 100.0 | 100.0 | 100.0 |

* Forced to total 100%.

TABLE 6.—*Number of Physicians Holding Board Certificates by Field of Specialization*

| | Army | Navy | Air Force |
|---|---|---|---|
| Pediatrics | 16 | 17 | 15 |
| Psychiatry and neurology | 15 | 3 | 8 |
| Orthopedic surgery | 4 | 6 | 3 |
| Dermatology and syphilology | 4 | 1 | 1 |
| Radiology | 10 | 3 | 4 |
| Urology | 2 | 0 | 1 |
| Obstetrics and gynecology | 1 | 3 | 0 |
| Internal medicine | 28 | 17 | 7 |
| Ophthalmology | 8 | 7 | 3 |
| Pathology | 6 | 2 | 2 |
| Otolaryngology | 5 | 2 | 5 |
| Surgery | 17 | 18 | 9 |
| Anesthesiology | 2 | 3 | 2 |
| Plastic surgery | 0 | 1 | 0 |
| Neurological surgery | 2 | 1 | 0 |
| Physical medicine | 2 | 0 | 0 |
| Preventive medicine and public health | 0 | 0 | 0 |
| Proctology | 0 | 0 | 0 |
| Thoracic surgery | 2 | 0 | 0 |
| Not specified | 4 | 4 | 4 |
| Total | 128 | 93 | 69 |

### Number of Physicians Holding Board Certificates

Table 6 shows the detailed numbers, by specialty and branch of service, of physicians holding board certificates. Of the 290 persons responding to the question, 128 holding board certificates were in the Army, 93 were in the Navy, and 69 were in the Air Force. The specialties covered over 19 different fields of which the largest was internal medicine, the second largest was pediatrics, and the third largest was surgery. It is interesting to note that in the previous report surgery was first, followed by pediatrics and internal medicine. By branch of service, a total of 25% of those responding in the Army and Navy and 17% of those in the Air Force had board certificates.

### Reserve Status

Of the 2,191 physicians reporting, 764 indicated they retained their reserve commissions while 1,407 resigned their commissions. There were 20 who did not respond. By services, the Army had 242 retaining commissions and 722 resigning; the Navy had 351 retaining and 182 resigning; and the Air Force had 171 retaining and 503 resigning their commissions. Table 7 reflects the percentages by branch of service.

TABLE 7.—*Percentage Distribution of Physicians According to Reserve Status*

| | Army, % | Navy, % | Air Force, % |
|---|---|---|---|
| Retained commission | 24.9 | 65.3* | 25.1 |
| Dropped commission | 74.3 | 33.8 | 73.9 |
| No response | 0.8 | 0.9 | 1.0 |
| Total | 100.0 | 100.0 | 100.0 |

* Forced to total 100%.

### Government Medical Education Received

Of the 2,191 physicians responding, a total of 1,153 stated that they had received assistance in their medical education from the government. There were 1,013 who indicated they had received no government assistance and 25 who failed to answer the question. The largest single group receiving government assistance was under the Navy V-12 Program. The next two largest groups were under the Army Specialized Training Program and the GI Program. Table 8 shows the percentages by branch of service.

TABLE 8.—*Distribution of Physicians by Type of Governmental Medical Education Received*

| | Army, % | Navy, % | Air Force, % |
|---|---|---|---|
| Army Specialized Training Program | 21.9 | 11.7 | 19.4 |
| Navy V-12 | 8.4 | 53.0 | 11.9 |
| GI Bill | 3.3 | 4.8 | 4.4 |
| ASTP and GI Bill | 5.2* | 0.8* | 5.6 |
| Navy V-12 and GI Bill | 2.6 | 7.4 | 3.7 |
| Other | 0.8 | 0.9 | 2.0 |
| No assistance | 56.9 | 20.1 | 51.7 |
| No reply | 0.9 | 1.3 | 1.3 |
| Total | 100.0 | 100.0 | 100.0 |

* Forced to total 100%.

### Training Received While in Service

Of a total of 2,191 questionnaires received, 1,814 physicians replied to the question concerning the types of military medical training received while they were on active duty. There were 377 physicians who did not respond to this question. Of those responding, 916 who served in the Army, 317 in the Navy, and 581 in the Air Force indicated they received additional training or experience in service schools. The Medical Field Service School accounted for the largest number, with the School of Aviation Medicine the second largest group. Table 9 indicates the number and percentage

distribution of physicians by type of training received in each branch of service. Since some of the physicians completed more than one course, the totals in table 9 refer to the total courses received rather than the number of responding physicians.

TABLE 9.—*Distribution of Physicians by Type of Governmental Medical Training Received*

| | Army | | Navy | | Air Force | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Basic course, Medical Field Service School | 846 | 87.0 | 26 | 4.8 | 150 | 22.0 |
| Marine Medical Officers Training | 0 | 0.0 | 46 | 8.6 | 0 | 0.0 |
| Advanced courses, Medical Field Service School | 22 | 2.3 | 0 | 0.0 | 2 | .3 |
| Marine Field Service Training | 1 | .1 | 51 | 9.5 | 1 | .1 |
| School of Aviation Medicine | 7 | .7 | 67 | 12.5 | 281 | 41.3 |
| Amphibious Forces Training School | 0 | 0.0 | 45 | 8.4 | 0 | 0.0 |
| Other schools | 94 | 9.7 | 146 | 27.1 | 191 | 28.0 |
| No response | 56 | 5.8 | 221 | 41.1 | 100 | 14.7 |
| Total | 1026 | | 602 | | 725 | |

## Physicians' Evaluation of Medical Military Training

The majority of physicians filling out the questionnaire felt that all important features of medical military training had been satisfactorily covered. A small percentage indicated the training was unsatisfactory, but gave no specific reasons. Others stated reasons why they considered their tour of service unsatisfactory. According to services, the response to this multiple-answer question was 972 from the Army, 538 from the Navy, and 681 from the Air Force. Table 10 indicates percentages by branch of service.

TABLE 10.—*Physicians' Evaluation of Medical Military Training*

| | Army, % | Navy, % | Air Force, % |
|---|---|---|---|
| Satisfactory | 78.4 | 70.2 | 85.2 |
| Unsatisfactory | 21.6 | 29.8 | 14.8 |
| Unsatisfactory and insufficient training in | | | |
| Military customs, administration, and regulations | 28.8 | 14.1 | 22.1 |
| Basic orientation and indoctrination | 24.7 | 58.3 | 24.2 |
| Military medicine and surgery | 15.3 | 10.3 | 11.6 |
| Miscellaneous | 31.2 | 17.3 | 42.1 |
| | 100.0 | 100.0 | 100.0 |
| Total | 100.0 | 100.0 | 100.0 |

TABLE 11.—*Physicians' Evaluation of Assignment*

| | Army, % | Navy, % | Air Force, % |
|---|---|---|---|
| Properly assigned | 75.8 | 69.0 | 80.2 |
| Not properly assigned | 23.8 | 30.1 | 19.5 |
| No response | 0.4 | 0.9 | 0.3 |
| Total | 100.0 | 100.0 | 100.0 |

TABLE 12.—*Physicians' Satisfaction with Assignment*

| | Army, % | Navy, % | Air Force, % |
|---|---|---|---|
| Satisfied | 68.6 | 66.9 | 70.5 |
| Not satisfied | 29.7 | 30.9 | 29.1 |
| No response | 1.7 | 2.2 | 0.4 |
| Total | 100.0 | 100.0 | 100.0 |

## Physicians' Evaluation of Assignment

A large majority of the physicians (approximately 75% of the services combined) indicated that they were properly assigned. Also, a greater number of physicians indicated that they were satisfied than not satisfied with their assignments (although the majority was less decisive in this second case). In answer to both questions, a greater portion of the Army and Air Force physicians responded favorably than did naval medical officers. Tables 11 and 12 show the percentages by branch of service.

TABLE 13.—*Percentage of Time Spent in Treating Military Personnel, Dependents of Military Personnel, and Others*

**A. January-June 1955**

| Percentage of time | Under 20% | 20-50% | 50% and Over |
|---|---|---|---|
| Military personnel | | | |
| Domestic | 18.8 | 34.6 | 46.6 |
| Overseas | 19.1 | 30.3 | 50.6 |
| Dependents of military personnel | | | |
| Domestic | 28.6 | 36.7 | 34.7 |
| Overseas | 35.5 | 39.4 | 25.1 |
| Administrative duties | | | |
| Domestic | 64.7 | 28.4 | 6.9 |
| Overseas | 60.5 | 29.6 | 9.9 |
| Idle | | | |
| Domestic | 50.1 | 34.3 | 15.6 |
| Overseas | 35.4 | 29.8 | 34.8 |
| Other | | | |
| Domestic | 31.6 | 18.9 | 49.5 |
| Overseas | 51.6 | 24.7 | 23.7 |

**B. July-December 1955**

| Percentage of time | 75-100% | 50-75% | 50% | 25-50% | Under 25% |
|---|---|---|---|---|---|
| Military personnel | | | | | |
| Domestic | 27.3 | 13.9 | 16.0 | 16.7 | 26.1 |
| Overseas | 42.5 | 13.8 | 17.7 | 11.0 | 15.0 |
| Dependents of military personnel | | | | | |
| Domestic | 26.5 | 11.2 | 15.4 | 16.4 | 30.5 |
| Overseas | 14.5 | 6.3 | 17.8 | 20.1 | 41.3 |
| Other | | | | | |
| Domestic | 20.2 | 3.3 | 4.5 | 9.3 | 62.7 |
| Overseas | 8.6 | 5.5 | 11.0 | 13.7 | 61.2 |

## Types of Patients Treated

One of the questions was designed to determine the percentage of time devoted by physicians to military personnel, dependents of military personnel, and administrative duties, both at domestic and overseas stations. Because the form and structure of this question was altered on the questionnaire covering the months January-June, 1955, the response to this question could not be combined with those concerned with the first six months of the year; thus the responses for the months January-June, 1955, are shown on part A of tables 13 and 14, and those for July-December, 1955, on part B of the same tables.

TABLE 14.—*Breakdown of Time Allotted to Military Personnel and Their Dependents*

**A. January-June 1955**

| | Military Personnel | | Dependents | |
|---|---|---|---|---|
| Percentage of Time | Domestic | Overseas | Domestic | Overseas |
| 0-19 | 22.4 | 21.2 | 31.9 | 52.0 |
| 20-49 | 33.1 | 29.5 | 35.0 | 29.3 |
| 50 and over | 44.5 | 49.3 | 33.1 | 18.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

**B. July-December 1955**

| | Military Personnel | | Dependents | |
|---|---|---|---|---|
| Percentage of Time | Domestic | Overseas | Domestic | Overseas |
| 75-100 | 27.3 | 42.5 | 26.1 | 14.5 |
| 50-75 | 13.9 | 13.8 | 11.1* | 6.3 |
| 50 | 16.0 | 17.7 | 15.2 | 17.8 |
| 25-50 | 16.7 | 11.0 | 17.6 | 20.1 |
| 25 and under | 26.1 | 15.0 | 30.0 | 41.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

* Forced to total 100%.

## Types of Patients Treated

One of the questions was designed to determine the percentage of time devoted by physicians to military personnel, dependents of military personnel, and administrative duties, both at domestic and overseas stations. Because the form and structure of this question was altered on the questionnaire covering the months January-June, 1955, the response to this question could not be combined with those concerned with the first six months of the year; thus the responses for the months January-June, 1955, are shown on part A of tables 13 and 14, and those for July-December, 1955, on part B of the same tables.

### Types of Nonmilitary Medical Care Provided

The type of medical care most frequently performed by medical officers for nonmilitary persons was outpatient care. Second in order of frequency for all three services was general medical and hospital care (although in the Navy "other specialty services" also tied for second place). For the Army, "other specialty services" was third in order, with obstetrics and gynecology the third in order for the Navy and Air Force. Table 15 shows the percentage and types of care.

TABLE 15.—*Distribution of Physicians by Type of Nonmilitary Medical Assignments*

| | Army | | Navy | | Air Force | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| General medical and hospital care | 228 | 15.1* | 122 | 14.2 | 188 | 15.9 |
| Obstetrics and gynecology | 159 | 10.6 | 109 | 12.7 | 184 | 15.6 |
| Pediatrics | 149 | 9.9 | 95 | 11.1 | 144 | 12.2 |
| Outpatient care | 459 | 30.5 | 271 | 31.7 | 362 | 30.7 |
| Surgery | 156 | 10.4 | 83 | 9.7 | 126 | 10.7 |
| Other | 194 | 12.9 | 122 | 14.3 | 133 | 11.3 |
| No response | 159 | 10.6 | 54 | 6.3 | 43 | 3.6 |
| Total | 1504 | 100.0 | 856 | 100.0 | 1180 | 100.0 |

* Forced to total 100%.

TABLE 16.—*Physicians Indicating Possible Transfer of Duties to Other Personnel*

**A. January-June 1955**

| | Army | | Navy | | Air Force | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Possible Transfer to Nurses | 4 | 1.8 | 1 | 0.5 | 0 | 0.0 |
| Enlisted medical personnel | 4 | 1.8 | 14 | 7.3 | 5 | 2.0 |
| Civilian medical personnel | 147 | 66.5 | 133 | 69.6 | 172 | 69.9 |
| Other medical personnel | 19 | 8.6 | 7 | 3.7 | 21 | 8.5 |
| Nurses and enlisted personnel | 5 | 2.3 | 3 | 1.6 | 5 | 2.0 |
| Nurses and civilian personnel | 8 | 3.6 | 6 | 3.2* | 11 | 4.5 |
| Enlisted and civilian personnel | 5 | 2.3 | 5 | 2.6 | 9 | 3.7 |
| Enlisted and other personnel | 2 | 0.9 | 1 | 0.5 | 2 | 0.8 |
| Civilian and other personnel | 13 | 5.9 | 14 | 7.3 | 8 | 3.3 |
| All of the above | 14 | 6.3 | 7 | 3.7 | 13 | 5.3 |
| Total | 221 | 100.0 | 191 | 100.0 | 246 | 100.0 |

* Forced to total 100%.

**B. July-December 1955**

| | Army | | Navy | | Air Force | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Yes, All Domestic | 210 | 39.7 | 89 | 44.1 | 138 | 41.2 |
| Overseas | 43 | 8.1 | 14 | 6.9 | 31 | 9.2* |
| Yes, Most Domestic | 79 | 14.9 | 29 | 14.3* | 51 | 15.2 |
| Overseas | 19 | 3.6 | 4 | 2.0 | 24 | 7.2 |
| Some Domestic | 50 | 9.5 | 25 | 12.4 | 29 | 8.7 |
| Overseas | 44 | 8.3 | 5 | 2.5 | 22 | 6.6 |
| None Domestic | 20 | 3.8 | 6 | 3.0 | 2 | 0.6 |
| Overseas | 64 | 12.1 | 30 | 14.8* | 38 | 11.3 |
| Total | 529 | 100.0 | 202 | 100.0 | 335 | 100.0 |

* Forced to total 100%.

### Duties That Could Have Been Performed Adequately by Other Personnel

A total of 1,283 physicians answered the question pertaining to duties that could have been performed by other personnel; 88 physicians did not reply, 535, or 41.7%, stated that their duties could not have been performed adequately by other personnel, while 660, or 51.4%, felt their duties could have been performed by other personnel. The 660 physicians who responded to this multiple-answer question in the affirmative gave detailed information as shown in table 16A for the months January-June 1955; table 16B, for the remainder of the year, indicates the percentages of physicians at domestic and overseas stations who believed that their duties could have been performed by other personnel.

### Physicians Who Would Voluntarily Remain in Service

In response to the question relative to military service beyond the obligated tour of duty, 923 physicians indicated they would not be willing to stay in military service for more than their two years of service under any circumstances. A total of 1,203 physicians indicated they would serve an additional period under certain conditions. There were 65 who failed to reply to the question. Table 17 reflects the reasons or conditions under which an additional period of service would be acceptable.

TABLE 17.—*Distribution of Physicians Indicating Conditions of Voluntary Extension of Service Beyond Two-Year Requirement*

| | Army | | Navy | | Air Force | |
|---|---|---|---|---|---|---|
| Conditions | No. | % | No. | % | No. | % |
| Total war | 197 | 25.0 | 92 | 18.1 | 124 | 19.6 |
| All doctors serving on an equitable basis | 14 | 1.8 | 13 | 2.5* | 13 | 2.1 |
| Promotion to higher rank | 54 | 6.9 | 26 | 5.1 | 47 | 7.4 |
| Increase in pay | 90 | 11.4 | 55 | 10.8 | 106 | 16.8 |
| Given residency or further training | 40 | 5.1 | 33 | 6.5 | 48 | 7.6 |
| Opportunity to practice specialty | 60 | 7.6 | 53 | 10.4 | 46 | 7.3 |
| Choice of duty assignment | 61 | 7.8 | 41 | 8.1 | 43 | 6.8 |
| Choice of stable location | 61 | 7.7 | 46 | 9.0 | 65 | 10.3 |
| Living quarters for family | 28 | 3.6 | 10 | 2.0 | 25 | 3.9* |
| Request for extension at status quo refused | 3 | 0.4 | 2 | 0.4 | 2 | 0.3 |
| Extended service time voluntary | 22 | 2.8 | 31 | 6.1 | 14 | 2.2 |
| Miscellaneous conditions | 157 | 19.9 | 107 | 21.0 | 99 | 15.7 |
| Total | 787 | 100.0 | 509 | 100.0 | 632 | 100.0 |

* Forced to total 100%.

### Suggestions for Improvement of Service Given by Medical Associations to Military Physicians

A total of 1,729, or 78.9%, responded to the question concerning the role of national and local medical associations in maintaining closer contact or rendering better service to their members who served as physicians in the armed forces. Of these, 819 had no suggestions. The suggestions of the remaining 910 physicians are tabulated in table 18.

TABLE 18.—*Suggestions for Improvement of Service Given by Medical Associations to Military Physicians*

| Suggested Society Activities | Army | Navy | Air Force |
|---|---|---|---|
| More information, newsletters | 105 | 50 | 77 |
| Personal visits by civilian physicians to evaluate grievances | 92 | 29 | 61 |
| Invitation of military physicians to civilian medical meetings | 48 | 47 | 71 |
| Assistance in locating a position after discharge | 18 | 12 | 21 |
| Assistance in preventing evasion of military service | 12 | 16 | 9 |
| Distribution of questionnaires to physicians in service | 39 | 17 | 33 |
| Provision of specialists for clinical conferences | 28 | 16 | 29 |
| Miscellaneous suggestions | 60 | 22 | 32 |
| Total | 402 | 209 | 333 |

## MEDICINE AND THE LAW

*This is the seventh in a series of articles dealing with medical professional liability. An editorial (page 360) and chronological résumé (page 364) appeared in* THE JOURNAL, *Feb. 2. One of the preceding articles in this series has been published each week in* THE JOURNAL *beginning Feb. 9, 1957.*—ED.

# "RES IPSA LOQUITUR"—LIABILITY WITHOUT FAULT

R. Crawford Morris, LL.B., Cleveland

### Introduction [1]

Throughout the United States and England medical malpractice lawsuits are alarmingly on the increase. So are the size of the verdicts rendered therein.

Newsweek Magazine reports:[2] "Some 5,000 cases are now being tried each year with thousands of other cases settled out of court. Since 1950, one out of every 35 doctors insured under the New York State Medical Society's group-insurance plan has been sued in the courts for malpractice."

The chairman of the District of Columbia Medical Society Professional Liability Insurance Committee (where recently 115 malpractice cases were pending and the doctors found all group insurance withdrawn from them) states:[3] "Only about one in seven or eight of the district cases shows any voluntary negligence on the doctor's part. Nonetheless, the doctor loses about one in four cases."

England's experience is the same:[4] "The flood of claims against doctors which has been steadily rising during the past few years, shows no sign of subsiding. In fact, in the year under review, the number of such claims has again shown an increase."

Verdicts are even more alarming. In a very recent case,[5] a San Francisco jury returned a malpractice verdict in the sum of $250,000. A few months before, a San Diego jury [6] returned a malpractice verdict in the sum of $210,000. A Tennessee jury [7] returned a malpractice verdict of $200,000, a federal jury [8] one of $123,000, a Texas jury [9] one over $100,000, and a Wisconsin jury one of $97,000.[10]

In fact, the medical malpractice picture is changing so catastrophically that one wonders if the law itself is changing:[11] "The increase in the number of actions against hospitals and doctors has given rise to the feeling in some quarters that the law of negligence, in so far as it affects doctors has undergone a drastic change." [12]

We submit, and earnestly hope, that it has not, and that our courts will continue to adhere to those safeguards of the law requiring legal proof of negligence by expert testimony in medical malpractice cases. The rationale of recent cases extending the doctrine of *res ipsa loquitur*, however, alarms us and commands our serious attention.

### Theory of the Law

The basic theory of our law is that he who accuses must prove.[13] In medical malpractice cases this means "*must prove by expert medical testimony*," [14] for the jury, which alone is empowered to determine all disputed questions of fact, can have no opinion upon complicated medical questions unless furnished that opinion by doctors themselves testifying in the case. Nothing is more fundamental to the law than that a jury must not be permitted to speculate: [15] "Under our law it is just as pernicious to submit a case to a jury and permit the jury to speculate with the rights of citizens when no question for the jury is involved, as it is to deny to a citizen his trial by jury when he has the right." [16]

Jury speculation in medical malpractice cases means that the jury must guess whether or not a physician's particular course of conduct constituted malpractice, that is, whether the defendant-doctor "in the performance of his service either did some particular thing or things that physicians and surgeons of ordinary skill, care, and diligence would not have done under the same or similar circumstances, or that the defendant failed or omitted to do some particular thing or things that physicians and surgeons of ordinary skill, care, and diligence would have done under the same or similar circumstances." [17] For manifestly, a lay jury of men and women, untrained in medicine, can have no opinion as to what "thing or things" a physician or surgeon of ordinary skill would or would not have done under similar circumstances save as a physician or surgeon tells the jury by testifying in open court. To prevent jury speculation with the rights of the medical profession, the law has always required that the patient prove his claims against the doctor by expert medical testimony of other doctors of the same school of medicine. Such testimony must be that in the opinion of the doctor-witness the defendant-doctor did (or failed to do) some particular thing or things that physicians and surgeons of ordinary skill, care, and diligence would not have done (or would have done) under similar circumstances. If the patient failed to produce such testimony, then the case was withdrawn from the jury's speculation and judgment entered for the defendant-doctor as a matter of law by the court.

Once the patient has produced such testimony, however, then it becomes the province of the jury to weigh the probative value of such testimony and, in the event other doctors have expressed contrary opinions on behalf of the defendant-doctor, to determine from a consideration of all such opinions and all the other evidence what it finds the medical fact to be in the case before it, namely, whether the defendant-doctor "did (or failed to do) some particular thing

or things that physicians and surgeons of ordinary skill, care, and diligence would not have done (or would have done) under similar circumstances." When doctors' opinions differ, the jury and only the jury has the power and the duty to resolve those differences.

There has long been an exception to this rule, inherent in the rationale of the rule itself, namely, that when the act complained of by the patient is so simple as to be within the lay knowledge of the average citizen-juror, then the patient need not produce expert medical testimony but is entitled to have his case submitted to the jury for determination without such proof.[18] For example, such claims as severe burn following a mere x-ray picture to reveal a fracture,[19] foreign bodies left in the tissues,[20] hot-water bottle burns,[21] failure of the doctor to attend the patient frequently enough,[22] have been held to fall within this exception. The rationale is clear: in such cases "the particular thing or things" complained of is within the lay experience of the average juror and therefore the jury can form an intelligent opinion without the guidance of expert medical testimony, whereas in the case of a complicated medical procedure the jury, without medical testimony to give it a yardstick by which to measure the defendant-doctor's conduct, can form no opinion beyond mere guess or speculation.

There is a second exception in the law to the fundamental rule that he who accuses must prove, which has sometimes been applied to malpractice cases. That exception is known by the Latin phrase *res ipsa loquitur*.

## "Res Ipsa Loquitur"

Originally the offspring of a casual word of Baron Pollock during legal argument,[23] the phrase translated means nothing more than "the thing speaks for itself." Around this phrase there has evolved a legal doctrine that has been severely criticized: "It adds nothing to the law, has no meaning which is not more clearly expressed for us in English, and brings confusion to our legal discussions. It does not represent a doctrine, is not a legal maxim, and is not a rule." [24]

Basically the doctrine is simply this:

> Negligence may be proved by circumstantial evidence. One type of circumstantial evidence to which the courts have given the name res ipsa loquitur, arises where
>
> (a) the accident is of a kind which ordinarily does not occur in the absence of someone's negligence, and
>
> (b) It is caused by an instrumentality within the exclusive control of the defendant, and
>
> (c) The possibility of contributing conduct which would make the plaintiff (patient) responsible is eliminated.[25]

The renowned Justice Holmes, while still on the bench of the Supreme Judicial Court of Massachusetts, in his usual terse style defined it simply, thus: [26]

> 'Res ipsa loquitur,' which is merely a short way of saying that, so far as the court can see, the jury, from their experience as men of the world, may be warranted in thinking that an accident of this particular kind commonly does not happen except in consequence of negligence, and that therefore there is a presumption of fact, in the absence of explanation or other evidence which the jury believe, that it happened in consequence of negligence in this case. Presumptions of fact, or those general propositions of experience which form the major premises of particular conclusions of this sort, usually are for the jury. The court ordinarily confines itself to considering whether it can say that there is no such presumption, or, in other words, that such accidents commonly are not due to negligence.

Historically, this principle has been applied to cases of falling objects,[27] explosions,[28] railroad derailment,[29] etc., wherein the object was in the exclusive control of the defendant and the accident was of a kind that does not ordinarily occur in the absence of someone's negligence.

The doctrine has also been invoked, however, in cases where from the very occurrence of the events themselves the injured party knew and could know nothing of what has happened to him, but the defendant had such knowledge available to him.[30] To invoke the general rule that he who accuses must prove in such circumstances seemed so harsh and unfair that some courts uttering the phrase *res ipsa loquitur* turned to the defendant requiring him to furnish the explanation of what happened and to show that the occurrence was due to no negligence on his part. This extension of the doctrine would seem to make of *res ipsa loquitur* merely a rule of sympathy rather than a rule of law and has been severely criticized in many quarters.[31] When extended to medical malpractice cases, this "rule of sympathy" becomes exceedingly unfair to the defendant-doctor, for it can be applied to every case of an untoward result following any operation wherein the anesthetized patient knows nothing of what occurred to her, whereas the surgeon has some knowledge, with the result that the jury is forced to speculate with the rights of the surgeon—more often than not with disastrous financial consequences to the surgeon.[32]

## Medical Malpractice and "Res Ipsa Loquitur" [33]

Perhaps a simple but basic observation is here in order. Generally (with local variations to be sure) medicine is medicine everywhere. Mumps is mumps in England or in Australia. Not so the law! The law in one state may not be the law in another state. In fact, if the court of last resort has not spoken, the law in one county may differ from that in another county of the same state. This results in different laws in each of the 48 states and a body of federal law besides. However, in the main, these are but local variations, for the law in most of the states was patterned on the common law in England which gives our state law a common heritage and basis. Since this monograph is directed to physicians and surgeons practicing medicine all over the United States, no attempt will be made to cover the law of all jurisdictions, but cases will be discussed on the basis of their contribution to the medical profession's understanding of the general problem regardless of the jurisdiction in which the cases arose and were decided.

In one case [34] the Supreme Court of North Carolina said:

> Much loose discussion has been given to the question of the availability of res ipsa loquitur in medical and surgical cases involving charges of malpractice. Our own court has been somewhat restrictive in applying the doctrine. The restrictions, none too well defined and, therefore, the source of controversy, seem to spring from the recognized and often repeated rule that a physician or surgeon is not a guarantor of the result of his treatment. Some further obstacles to the application of the

doctrine in certain connections have arisen from two conflicting theories, which we sometimes find advanced in the same case: First, that the practice of medicine and surgery is largely empirical (which means unscientific), therefore, the doctrine would have little or no significance; and, second, that these professions are so highly scientific that the doctrine or inference would have no meaning except to men learned in the profession, certainly not to a jury. Either way you put it, on these theories all facts are considered consistent with proper treatment until professionally shown to be otherwise.

It follows, from the rule that the physician or surgeon is not an insurer of results, that no presumption can arise from the mere result of a treatment upon the theory that it was not satisfactory or less than could be desired, or different from what might be expected . . . We must not be understood as holding that under no circumstances might the condition in which the plaintiff has been left, as a result of the treatment, give rise to the presumption of res ipsa loquitur, or that under no circumstances may a treatment, however unreasonable and plainly destructive of the curative purpose, give rise to the doctrine, despite the empiric and professional veil. Such cases must stand upon their own bottom.

But where proper inferences may be drawn by ordinary men from approved facts which give rise to res ipsa loquitur without infringing this principle, there should be no reasonable argument against the availability of the doctrine in medical and surgical cases involving negligence, just as in other negligence cases, where the thing which caused the injury does not happen in the ordinary course of things, when proper care is exercised.

The Supreme Court of California has said: [35]

Moreover, such a rule is not justified by either reason or authority.

The law has never held a physician or surgeon liable for every untoward result which may occur in medical practice. It requires only that he shall have the degree of learning and skill ordinarily possessed by physicians of good standing practicing in the same locality and that he shall use ordinary care and diligence in applying that learning and skill to the treatment of his patient. . . . Whether he has done so in a particular case is a question for experts and can be established only by their testimony. . . . And when the matter in issue is one within the knowledge of experts only and is not within the common knowledge of laymen, the expert evidence is conclusive. . . . Negligence on the part of a physician or surgeon will not be presumed; it must be affirmatively proved. On the contrary, in the absence of expert evidence, it will be presumed that a physician or surgeon exercised the ordinary care and skill required of him in treating his patient. . . .

It is true that in a restricted class of cases the courts have applied the doctrine of res ipsa loquitur in malpractice cases. But it has only been invoked where a layman is able to say as a matter of common knowledge and observation that the consequences of professional treatment were not such as ordinarily would have followed if due care had been exercised. For example, it has been applied where a sponge was left in the body of the patient after closing an operative incision. . . .; where the patient was burned by the application of hot compresses or heating apparatus . . .; where the patient was burned through the operation of an X-ray machine . . .; and where the patient sustained an infection through the use of an unsterilized hypodermic needle . . . In each one of these situations the rule was applied because common knowledge and experience teaches that the result was one which would not have occurred if due care had been exercised."

No one can quarrel with these statements. They meet the safeguards against jury speculation laid down by the law. In those cases where "the particular thing or things" done or left undone by the defendant-physician are so gross as to be obvious to the lay juror and well within his nonmedical lay experience, the law rightly does not require reiteration of them by expert medical testimony. For in such instances the lay jury is competent to form an opinion of its own without such medical guidance and its verdict so reached is not speculation or guess, but grounded on its own experience.

What is alarming is the recent tendency in some courts toward extending this perversion of the doctrine of *res ipsa loquitur*, which for lack of a better term we have characterized as a "rule of sympathy," into the medical malpractice field wherein untoward results may occur during conditions (such as found in every operation wherein the patient because of the anesthetic knows nothing of what occurred) appealing to the natural sympathy of the courts. The outcome is often disastrous to the medical profession because the "rule of sympathy" removes the safeguard of the law preventing jury speculation, that he who accuses a doctor of malpractice in his chosen profession must prove that malpractice by expert medical testimony from members of that same profession, qualified by training and experience to have intelligent opinions, not guesses, concerning the propriety of the acts complained of. For when forced to speculate, the jury's natural sympathy for a personal injury with its attendant pain and suffering often colors its guesswork to the deteriment of the defendant-doctor.

Perhaps an example will make the problem clear. We have quoted with approval the Supreme Court of California's statement of *res ipsa loquitur's* limited application in medical malpractice cases.[36] That case was decided in 1939. The medical facts involved were that during an operation upon plaintiff's knee, the peroneal nerve was severed or injured so as to cause plaintiff to suffer thereafter from a "foot drop," where it was admitted that the peroneal nerve was in the operative field, and where there was medical testimony that, although the severance of the peroneal nerve is something which ordinarily does not occur in operations such as that performed by the defendant, yet even when the precautions prescribed by the approved technique are taken, there is a break or injury of it in between 5 and 9% of the cases.

The patient contended that since he was unconscious at the time, that the defendants had charge of the operation, that the result suffered by him does not ordinarily occur, and that in the absence of an explanation by the defendants justifying a verdict in their favor upon the ground they were not negligent, they were liable to him in damages.

In holding the doctrine of *res ipsa loquitur* inapplicable to these medical facts and that the patient would therefore have to prove through a qualified doctor-witness that in his opinion the injury to the peroneal nerve appearing after the operation was due to the negligence of the defendant-surgeon in doing (or leaving undone) some particular thing or things which a surgeon of ordinary skill, care and experience would not have done (or would have done) under similar circumstances, the Supreme Court of California said: [37]

If this were the rule, as a practical proposition, no surgeon could ever operate without being an insurer of a medically satisfactory result . . . Probably in every operation there is some hazard which the medical profession recognizes and guards against but which is not always overcome. To say that the doctrine of res ipsa loquitur allows the recovery of damages in

every case where an injury does not ordinarily occur, would place a burden upon the medical profession which the law has not heretofore laid upon it. . . .

It is true that in a restricted class of cases the courts have applied the doctrine of res ipsa loquitur in malpractice cases. But it has only been invoked where a layman is able to say as a matter of common knowledge and observation that the consequences of professional treatment were not such as ordinarily would have followed if due care had been exercised. . . . But the present case shows an entirely different situation. Here what was done lies outside the realm of the layman's experience. Medical evidence is required to show not only what occurred but how and why it occurred. That evidence establishes beyond question not only that the peroneal nerve may be injured even where due care is used but that this unfortunate result invariably occurs in a limited number of cases.

In 1944, however, the same court found no difficulty in invoking the rule of sympathy version of the *res ipsa loquitur* doctrine against the defendant-doctors in the following medical situation: [38] The patient consulted Dr. T. who diagnosed his ailment as appendicitis, and made arrangements for an appendectomy to be performed by Dr. S. at a hospital owned and managed by Dr. Sw. Plaintiff entered the hospital, was given a hypodermic injection, slept, and later was awakened by Drs. T. and S. and wheeled into the operating room by a nurse whom he believed to be defendant G., an employee of Dr. S. Dr. R., the anesthetist, also an employee of Dr. Sw., adjusted the plaintiff for the operation, pulling his body to the head of the operating table and, according to plaintiff's testimony, laying him back against two hard objects at the top of his shoulders, about an inch below his neck. Dr. R. then administered the anesthetic and plaintiff lost consciousness. When he awakened he felt a sharp pain about halfway between the neck and the point of the right shoulder. The pain spread down to the lower part of his arm, and after his release from the hospital he developed paralysis and atrophy of the muscles around the shoulder.

The plaintiff also consulted Dr. C., who had x-ray pictures taken, which showed an area of diminished sensation below the shoulder and atrophy and wasting away of the muscles around the shoulder.[39] In the opinion of Dr. C. plaintiff's condition was due to trauma or injury by pressure or strain applied between his right shoulder and neck.

Dr. G. expressed the opinion that plaintiff's injury was a paralysis of traumatic origin, not arising from pathological causes, and not systemic, and that the injury resulted in atrophy, loss of use, and restriction of motion of the right arm and shoulder.

To justify its application of *res ipsa loquitur* to these medical facts, the Supreme Court of California said: [40]

There is, however, some uncertainty as to the extent to which res ipsa loquitur may be invoked in cases of injury from medical treatment. . . . If the doctrine is to continue to serve a useful purpose, we should not forget that "the particular force and justice of the rule, regarded as a presumption throwing upon the party charged the duty of producing evidence, consists in the *circumstance that the chief evidence of the true cause, whether culpable or innocent, is practically accessible to him but inaccessible to the injured person. . . .*"[41]

The present case is of a type which comes within the reason and spirit of the doctrine more fully perhaps than any other. The passenger sitting awake in a railroad car at the time of a collision, the pedestrian walking along the street and struck by a falling object or the debris of an explosion, are surely not more entitled to an explanation than the *unconscious patient on the operating table.* Viewed from this aspect, it is difficult to see how the doctrine can, with any justification, be so restricted in its statement as to become inapplicable to a patient who submits himself to the care and custody of doctors and nurses, is rendered unconscious, and receives some injury from instrumentalities used in his treatment. Without the aid of the doctrine a patient who receives permanent injuries of a serious character, obviously the result of someone's negligence, would be entirely unable to recover unless the doctors and nurses in attendance voluntarily chose to disclose the identity of the negligent person and the facts establishing liability. . . .

The condition that the injury must not have been due to the plaintiff's voluntary action is of course fully satisfied under the evidence produced herein; *and the same is true of the condition that the accident must be one which ordinarily does not occur unless someone was negligent.* We have here no problem of negligence in treatment, but of distinct injury to a healthy part of the body not the subject of treatment, nor within the area covered by the operation. The decisions in this state make it clear that such circumstances raise the inference of negligence and call upon the defendant to explain the unusual result.

The language of this court's opinion leaves no doubt but that it is applying not *res ipsa loquitur,* but the "rule of sympathy" version. The court sympathizes with the unconscious patient who does not know what happened to him and so throws the defendant-surgeon into the lion's den of lay jury speculation, under the guise of *res ipsa loquitur.* We sympathize with the unconscious patient too. We agree that he is entitled to a full disclosure of the facts—of every detail of what went on while he was unconscious. But what he is not entitled to is *res ipsa loquitur.* One has to but look at the requirements of *res ipsa loquitur* to see that it cannot apply. First, the accident must be of a kind that ordinarily does not occur in the absence of someone's negligence. While such complications do not occur frequently in operations, they can and do occur for no known reason and without negligence on anyone's part. It has always been a fundamental axiom of the law that the mere happening of an accident, no matter how disastrous the consequences, is no evidence that there has been negligence.[42] In fact the presumption is quite to the contrary: The defendant-doctor is presumed by the law to have used due care toward the patient in the practice of his profession.[43] Negligence must be proved by the patient who claims it. Secondly, the instrumentality claimed to have caused the accident was never identified. Nor was it shown that anyone of the several defendants had exclusive control over it—for exclusive control by the defendant has always been one of the basic requirements of *res ipsa loquitur.*[44] Concerning these aspects the court has this to say:[45] "Plaintiff was rendered unconscious for the purpose of undergoing surgical treatment by the defendants; it is manifestly unreasonable for them to insist that he identify any one of them as the person who did the alleged negligent act."

Furthermore, even the meager requirement of the rule of sympathy—that the evidence is more accessible to the defendant-doctor than to the plaintiff-patient—has not been met! The patient, no matter how unconscious during the operation, has no trouble obtaining all of the facts if he hires a competent attorney. Today all jurisdictions have broad rules of discovery, which compel production of all testimony in advance of trial so that every fact is known. In his work "Modern Trials" Melvin M. Belli, a member of the California Bar, who has obtained outstandingly large verdicts

for patients against members of the medical profession, reveals this in the very same chapter in which he urges further extension of the *res ipsa loquitur* doctrine in the malpractice field. Says Belli: [46] "... depositions of every one of the doctors were taken, as provided by the California procedure. . . . These depositions were bound. Then I added the complete set of medical records from the hospital (*subpoenaed duces tecum* under the California procedure and Photostated). These records and testimony made a volume over six inches high. *Nothing further could be said at the trial.*"

In view of the California rules of discovery, so broad as to furnish the patient before trial every ounce of testimony that could be said at the trial, how can the Supreme Court of California honestly say that "the chief evidence of the true cause, whether culpable or innocent, is practically accessible to him (the defendant-surgeon) but inaccessible to the injured person." [47] Under modern pretrial discovery practice, we can see no justification for this "rule of sympathy" extension of the doctrine of *res ipsa loquitur*. Not only are the records available to the patient under modern trial procedure, but those records, under modern medical procedure [48] contain strict, accurate, full accounts of everything that went on, placed on the record shortly after the event took place and long before litigation arose, and in some instances even before the untoward result began to show itself.

The vice inherent in this rule of sympathy is not that it forces the doctors to go forward and furnish an explanation—the patient got that in full detail long before the trial began—the vice lies in the fact that once the court has invoked this rule, it then hurls the doctor into the lion's den of jury speculation without proof of negligence on his part by anyone, on the theory that *res ipsa loquitur*, once applied, requires jury determination no matter how adequate the doctor's explanation may be. This is not a legal requirement of the rule,[49] but as a practical matter it is almost universally the result.[50]

Under the rule, a full explanation by the defendant-doctor, consistent with no negligence on his part, may negative the inference otherwise arising.[51] Thus, in a case involving a surgeon cutting into the bowels during a hernia operation, the Supreme Court of Indiana said:[52]

"... the doctrine of res ipsa loquitur does not prevail where the party against whom it might apply accepts the duty of going on with the proof and details the entire transaction. In such a situation the presumption, inference or doctrine cease to exist and all questions concerning the injury must be determined from the evidence unaided by inference or doctrine of res ipsa loquitur."

What is the vice in jury speculation? Jurors are human beings, with all of the natural sympathy for the pain and suffering that accompany the untoward result. Jurors try to be fair, but when confronted with a task too great for them, they, like all of us taken out of our own field, become easily confused and hopelessly dependent on others for their expert opinions, having no experience of their own from which to form a judgment of the conduct involved.

This is especially true when one adds to their lack of specialized knowledge of the subject, all the tricks and clever innuendo at the command of any able trial counsel. One recalls Socrates' classic definition of a lawyer (then called rhetorician): "One who makes the worser appear the better cause." The danger to the doctor is that his professional conduct must be judged, not by his fellow medical practitioners who have the training and experience to competently and fairly judge him, but by 12 lay people who have no medical proof of his claimed negligence to guide them, but only can speculate as to his conduct as against the obvious and sometimes tragic untoward result. In their blind groping, the jurors have no trained background to enable them to appreciate the "medical facts of life," which confronted the surgeon when he undertook the task and which, without fault on his part, or on anyone's part, may predestine an untoward tragic result. As one able surgeon testified in one of our malpractice cases:[53]

Q. Now, Doctor, from your examination of Mrs. X and your treatment of her, do you have an opinion whether she was more likely to develop a fistula, following a total hysterectomy, than a normal person would?

A. In the general class of patients that come to us for the repair of vesical-vaginal fistulas—in many who come for removal of their uterus there has been a long period of inflammation in the pelvis or lower portion of the abdomen and in the tubes, which has been annoying; many times it has been that the patient has previous operations on the tubes or the uterus, or suspending the uterus, or different types of gynecological or female operations. So that this general class of patients, by the time they came to us, are already incapacitated so far as their local structures are concerned. The anatomy is considerably distorted and the blood supply very very often impaired. Consequently one hesitates to make these vesical-vaginal fistulas at all, for repair, because just such things as you see now very often is the result. The patient does not understand the difficulties of the operation. They just go by results. No thought concerning the difficulty of the technicalities of the case.

Now in this particular patient there was a history of previous pelvic disease. There was an operation before, which involved her tubes.

It was with that history of prolonged inflammatory disease, in her pelvis, that she consulted the doctor, the defendant. It was after his operation, that I saw her.

Now, to answer the question, I think that this kind of a case would be predisposed to a vesical-vaginal fistula or other complications of which you could mention numerous, different kinds of complications. The answer has to be "Yes" because this is not an attractive type of surgery, to start with. As the boys say, you might say you have one or two strikes on you before you presume to contract with the patient for a nice job."

This is the vice inherent in *res ipsa loquitur*. It forces the jury to judge a doctor's highly specialized acts without permitting that jury the medical education it needs and is entitled to in order to correctly and fairly form that judgment. It is, indeed, unfair to the jury itself.[54]

And in a day of inflationary, astronomically large verdicts running into the hundreds of thousands of dollars, it is manifestly unfair to the defendant-doctor and even can be ruinous.

The Supreme Court of California has continued its rule of sympathy trend. In 1948 it had before it the following medical situation:[55] Preparatory to a varicose vein operation the defendant dipped a silver nitrate pencil supplied by the hospital into water and outlined on the patient's legs the veins that were to be removed; shortly afterwards her legs began to burn and became very inflamed around the areas marked by the defendant; and in a short time blisters formed at such areas. The defendant testified that silver nitrate

produces a stain that lasts 10 to 14 days; that the purpose of such markings is to outline the veins to be removed; that ordinarily there is no unfavorable reaction from the application of silver nitrate; that plaintiff, however, had such a reaction and was burned; that plaintiff had a very fair skin; that it was the common practice of doctors in San Francisco to mark off the area to be operated upon with a silver nitrate solution; and that it was also standard practice in this area to mark off the operating area without first making any tests.

The trial court refused to apply *res ipsa loquitur* and entered judgment for the defendant-doctor. A majority of the Supreme Court held that *res ipsa loquitur* applied saying:[56]

It is our opinion that the doctrine in question is applicable to the facts here involved. . . .

If the solution was too strong defendant or someone was negligent. If plaintiff was peculiarly susceptible to silver nitrate it was a question of fact whether defendant should have taken steps to ascertain that fact. At any rate, such susceptibility would be a matter of defense.

One judge dissenting remarked:[57]

It does not follow that because an injury does not ordinarily occur, in the rare instance in which an injury does occur the doctrine of res ipsa loquitur will permit the recovery of damages. "To say that the doctrine of res ipsa loquitur allows the recovery of damages in every case where an injury does not ordinarily occur, would place a burden upon the medical profession which the law has not heretofore laid upon it. Moreover, such a rule is not justified by either reason or authority."

• • •

"The law has never held a physician or surgeon liable for every untoward result which may occur in medical practice. It requires only that he shall have the degree of learning and skill ordinarily possessed by physicians of good standing practicing in the same locality and that he shall use ordinary care and diligence in applying that learning and skill to the treatment of his patient. . . . *Whether he has done so in a particular case is a question for experts and can be established only by their testimony. . . . And when the matter in issue is one within the knowledge of experts only and is not within the common knowledge of laymen,* the expert evidence is conclusive. . . . Negligence on the part of a physician or surgeon will not be presumed; it must be affirmatively proved. On the contrary, in the absence of expert evidence, it will be presumed that a physician or surgeon exercised the ordinary care and skill required of him in treating his patient. . . .

"Upon a mere showing that burns resulted from defendant's application of silver nitrate, can a layman say that the result was one which would not have occurred if due care had been exercised? . . . Here what was done lies outside the realm of the layman's experience."

In March, 1955, the Supreme Court of California had this medical situation before it:[58] A routine obstetrical case; patient in good health and mother of four children; spinal anesthetic by defendant W., doctor of medicine and a specialist in anesthesiology. The birth of the child followed spontaneously within a few minutes. Dr. H. was the delivering obstetrician. On the following morning plaintiff complained of pain in both legs and difficulty in moving them. She had pain in her back, neck, and head; also in her arms and wrists. Within two or three months thereafter, she regained the use of her right leg. At the time of trial, she still had pain in her left hip. However, she was able to bear some weight on her bent left ankle, and could get around much better.

The case was tried on the following theories of liability: (1) Dr. W. for negligence in administering the spinal anesthetic; (2) Dr. H. for knowingly permitting Dr. W. to so administer it; (3) the hospital as employer; (4) all three defendants under the doctrine of *res ipsa loquitur* as joint venturers, and for failure to call in a neurosurgeon and to arrange for a laminectomy.

Dr. W. testified that it was his opinion that the plaintiff's (spinal) nerve roots had been affected by the anesthetic solution used by him. The plaintiffs introduced in evidence hospital records that showed that Dr. W. arrived in the hospital delivery room at 9:00 p. m. and that two minutes later, at 9:02 p. m., the spinal anesthetic was completely administered. Plaintiffs introduced in evidence the written report of Dr. C., defendant hospital's staff neurologist, wherein he stated that Mrs. S.'s condition "indicated cord damage on the left in the lumbar region." Dr. W. unequivocally testified that he inserted his anesthetic needle in Mrs. S.'s spine at the interspace between the fourth and fifth lumbar vertebrae. Also that he used the standard accepted kind and amount of anesthetic normally used in obstetrical cases, and that there was no contraindication in the use of a spinal in this case.[59]

Doctor, after this some two days on the witness stand, nobody has yet asked you, do you now have an opinion as to the cause of this woman's condition?

Doctor W. replied:

My opinion is that the cause of this condition is a combination of two things, an unusual or altered reaction to the drugs she received. Q. The anesthetic, you mean? A. The anesthetic drugs that she received, plus a factor of functional overlay, psychic overlay. Q. So that, Doctor, tell us whether it is or is not true that in a certain small percentage of cases you do find a person who is sensitive to spinal anesthesia? . . . A. Yes. . . . Q. Does that happen, Doctor, in this small percentage of cases entirely without regard to any negligence on the part of the doctor? A. Yes. Q. Now, Doctor, one other question toward the last of this examination: You said in this case you did not consider or recommend the doing of a laminectomy. Will you explain that answer to us, please? A. Well, it was my feeling that, in view of the condition as it developed, there was no indication of any cord damage being present in this patient; that in the absence of cord damage, there would be no indication at all for doing a laminectomy.

The patient's own doctor was asked:[60] ". . . 'Were you able to form an opinion as to what the cause of this woman's difficulty is?' He answered: 'I really don't know the answer to that.'" He also testified that there was a functional overlay in appellant's case.

In refusing to apply *res ipsa loquitur* to this situation the Supreme Court of California said:[61]

And as stated in Ayers v. Parry, 3 C. R., 192 F. 2d 181, 185, a case decided by the U. S. Cir. Court of Appeals, involving application of New Jersey law:

"We think it is beyond dispute that the nerve roots which were damaged in the process of producing anesthesia by injecting the drug into the spinal column are within the region of treatment and that the cause of this injury to the nerve roots and its effect on the leg and adjacent organs must be explained by experts. When the expert testimony offered by the plaintiff ascribes the cause to the toxic quality of the injected drug as distinguished from the negligence of the anesthetist, that evidence is binding upon the court and the jury would not be permitted to speculate to the contrary."

Likewise here. Defendant W. met the qualifications required of an expert. His testimony established that the spinal anesthetic was administered in accord with accepted medical standards in the community. Moreover, believing that the damage here was

to the nerve roots and not to the spinal cord, his diagnosis that a laminectomy was not indicated was also in accord with good medical practice.

Negligence on the part of a physician or surgeon will not be presumed; it must be affirmatively proved. . . .

The record before this court fails to disclose any evidence tending to establish negligence on the part of either Dr. W. or Dr. H. in their care or treatment of Mrs. S. . . .

It further appears that the doctrine of res ipsa loquitur may not be invoked by appellants.

In the instant case, an inference may be drawn from substantial evidence in the record that the injury to Mrs. S. was not caused by negligence but was caused by some condition existing in the patient's system.

Rehearing was denied the patient in April.[62] However, in May such rehearing was granted and thereafter in December, 1955,[63] the Supreme Court of California reversed itself, and set aside its former opinion and applied *res ipsa loquitur* to this medical situation. Further rehearing was denied to the defendant-doctors.[64] In reversing itself, the Supreme Court of California said:[65]

From this evidence, it could have been legitimately inferred by the jury that plaintiff S's injuries were proximately caused from spinal cord damage caused by a spinal anesthetic administered between the twelfth thoracic and the first lumbar vertebrae; that a spinal anesthetic administered in that location was not good medical practice, or the exercise of that care and caution expected of a practicing physician in that community. . . .

Plaintiffs and defendants agree that the conditions to be met before the doctrine may be applied are that the accident, or injury must be of a kind which ordinarily does not occur in the absence of someone's negligence; that it must be caused by an agency or instrumentality in the control of the defendant; and that it must not have been due to any voluntary action or contribution on the part of plaintiff. . . .

Plaintiffs argue that it is a matter of common knowledge that a woman does not ordinarily become permanently paralyzed following childbirth after having had a spinal anesthetic administered as an incident thereto; that Dr. H. testified that "ordinarily where due care (was) used and proper practice followed, permanent paralysis (did) not follow"; . . .

Defendant W. argues that parlysis may result from a number of causes other than negligence in giving a spinal anesthetic; that in a certain percentage of cases paralysis will result from spinal anesthesia without any negligence; that plaintiffs introduced no proof that the practice used by him in administering the anesthetic was not the desirable or standard practice; . . .

. . . the applicability of the doctrine of *res ipsa loquitur* depends on whether it can be said, in the light of common experience, that the accident was more likely than not the result of their (defendants') negligence. (Citations) "Where no such balance of probabilities in favor of negligence can be found, *res ipsa loquitur* does not apply." . . .

"Another factor which some of the cases have considered in applying the doctrine is that the defendant may have superior knowledge of what occurred and that the chief evidence of the cause of the accident may be accessible to the defendant but inaccessible to the plaintiff. . . ."

This factor is peculiarly applicable, as well as necessary, in the type of situation we have here—where a patient suffers injury while unconscious and in the care and custody of the defendant, or defendants.

It would appear that plaintiffs have made out a prima facie case by both medical testimony and common knowledge that the injuries suffered by Mrs. S. are not such as usually occur in the circumstances without negligence on the part of someone. Defendant W's assertions to the contrary are matters for the finders of the facts.

Apparently Mrs. S. was unconscious at the time the spinal anesthetic was administered. Defendant W. contends that her condition could have been caused by a number of causes other than negligence in giving the anesthetic. There is no doubt that when Mrs. S. went to the delivery room she was in good health. . . . We also said that "where a plaintiff receives unusual injuries while unconscious and in the course of medical treatment, all those defendants who had any control over his body or the instrumentalities which might have caused the injuries may properly be called upon to meet the inference of negligence by giving an explanation of their conduct. . . . a patient injured while unconscious on an operating table in a hospital could hold all or any of the persons who had any connection with the operation even though he could not select the particular acts by the particular person which led to his disability." . . . In order that a plaintiff be entitled to the benefit of the doctrine of res ipsa loquitur, he need not exclude every other possibility that the injury was caused other than by defendant's negligence. . . . "Where the evidence is conflicting or subject to different inferences, it is for the jury, under proper instructions, to determine whether each of the conditions necessary to bring into play the rule of res ipsa loquitur are present." . . . The conclusion that negligence is the most likely explanation of the accident, or injury, is not for the trial court to draw, or to refuse to draw so long as plaintiff had produced sufficient evidence to permit the jury to draw the inference of negligence, even though the court itself would not draw that inference; . . . The inference of negligence is not required to be an exclusive or compelling one. It is enough that the court cannot say that reasonable men could not draw it. . . . The existence of the conditions upon which the operation of the doctrine is to be predicated is a question of fact and the *right of the jury to find those facts must be carefully preserved.*

Here the Court is saying that the patient not only need not prove that the defendant-doctor was negligent but that to satisfy the basic requirement of the rule of *res ipsa loquitur* (that the injury must be of a kind which ordinarily does not occur in the absence of someone's negligence) the patient need only show enough that the court cannot say that reasonable minds (of jurors) could not infer negligence even though the court itself would not infer negligence. This meager showing the patient evidently achieves merely by proving two readily conceded facts (1) that she was unconscious and (2) that she suffered an untoward result. We submit that this is not the doctrine of *res ipsa loquitur* at all but rather the rule of sympathy. As one California Judge remarked:[66] "A person about to undergo an operation is generally aware that there may be unforeseeable dangers incident thereto. He is entitled to an explanation of the conduct of the persons attending the operation, but he cannot reasonably expect them to be insurers of his safety."

A similar medical situation but with a very different legal result occurred in a Federal case involving New Jersey law.[67] There the medical situation was: the patient, with a history of two abdominal operations involving spinal anesthesia, underwent an emergency operation for an obstruction to the common bile duct. Spinal anesthesia was selected because the doctors were of the opinion that ether would be harmful to this patient's liver. Dr. H. administered the anesthesia agent through a needle inserted between the second and third lumbar vertebrae. This treatment was started at 9:50 p. m. The operation began at 10:10 p. m. and ended at 1:30 the next morning. During the operation gas, oxygen, and ether supplemented the spinal anesthetic. The common duct was located at about 1:00 a. m. whereupon the obstructing stones were removed and the cause of the infection was corrected.

Plaintiff testified that he was placed upon the operating table and assumed a "curled up" position to receive the anesthesia. He stated he "felt this jabbing of pain into my spinal column, and from that point on I had this terrific pain radiating down my (right) leg, such as a heavy electrical shock. I remember stiffening out. I remember screaming, and from that

point on I fainted and do not know what happened until the next morning in bed." He also said he fainted from the pain. The next morning plaintiff found he could not move his right leg and partial paralysis, marked atrophy, and sensory changes in this leg and in adjacent organs have persisted to the time of trial and probably will be permanent.

Dr. R., an expert anesthetist, hypothesized that if the pain was experienced it was caused by the needle striking the nerve roots. Dr. D., a neurologist, testified that a painful reaction to the puncture needle was a "common experience." Dr. R. further stated that if a patient has pain on the insertion of the needle, followed by stiffening and unconsciousness, the recognized procedure is for the anesthetist to try to determine what caused the unconsciousness and further action would depend on what he learns. As to whether or not defendants should have proceeded with this operation under the circumstances, Dr. R. was unable to express an opinion.

According to Dr. D.[68] "this patient suffered an injury to the nerve roots in the lower end of the spinal cord." He said, "The particular region is known as the cauda equina. That is called a cauda equinal neuritis. That condition was produced by the spinal anesthesia. . . . The following nerve roots were injured, on the right side from the eleventh thoracic, all the lumbars and all the sacrals right down to the fifth sacral nerve root." He further said that the anesthetic agent "had a toxic effect on these nerve roots . . . and that has given him the resultant paralysis, atrophy, and sensory changes, which are manifest on examination."

On cross examination Dr. A. agreed that the unfavorable reaction of plaintiff to the administration of the anesthetic was something that could not be predetermined and that it was one of the hazards of this anesthesia. He stated that the anesthetic solution produced a condition called[69] "archnoiditis, which is an inflammation about the spinal cord . . . that constricts and damages the nerves . . . and which occurs due to some unusual reaction on the part of the patient to that solution."

The United States Court of Appeals for the Third Circuit refused to apply the doctrine of *res ipsa loquitur* saying:[70]

> Occasionally expert testimony is not required where an injury results to a part of the anatomy not being treated or operated upon and is of such character as to warrant the inference of want of care from the testimony of laymen or in the light of the knowledge and experience of the jurors themselves. This situation arises when an ulterior act or omission occurs, the explanation of which does not require scientific opinion. . . . But where, as here, an injury to healthy tissue within the region of treatment constitutes an occurrence beyond the realm of the knowledge and experience of laymen, the issue of negligence with respect to that injury must be determined by expert testimony.
>
> We think it is beyond dispute that the nerve roots which were damaged in the process of producing anesthesia by injecting the drug into the spinal cord are within the region of treatment and that the cause of this injury to the nerve roots and its effect on the leg and adjacent organs must be explained by experts. When the expert testimony offered by the plaintiff ascribes the cause to the toxic quality of the injected drug as distinguished from the negligence of the anesthetist, that evidence is binding upon the court and the jury would not be permitted to speculate to the contrary. . . .
>
> It was not proved affirmatively that this defendant failed to ascertain the cause of unconsciousness, but, even if we assume this to be the fact, the causal connection between the omission and the injury was not shown and cannot be inferred. . . . Since Dr. R. was unable to render an opinion as to whether the operation should have proceeded or whether it should have been stopped, a matter which clearly calls for expert testimony, it is axiomatic that a jury should not be permitted to hazard a guess. . . .
>
> Res ipsa loquitur does not apply in malpractice cases where the injury is one which may occur even though proper care and skill are exercised. From the medical testimony, this seems to be the case sub judice.
>
> The doctrine does not apply where common knowledge or experience is not sufficiently extensive to permit it to be said that the patient's condition would not have existed but for the negligence of the doctors. Here the record is barren of any accident, or ulterior act or omission, which produced the injury such as a "slip" or "awkward thrust" of an instrument, or the injection of a harmful substance into the spinal canal. The painful reaction to the puncture needle is described as a "common experience."
>
> . . . Because the unfortunate consequences suffered by plaintiff in themselves do not as a matter of common knowledge and experience reveal lack of skill in the anesthetist, scientific opinion is clearly necessary to throw light on the subject. Seldom, indeed, would physicians administer a spinal anesthetic if they are to be held responsible solely for an adverse reaction of the anesthetic on the nerve roots.

## Comment

Thus the fallacy inherent in the rule of sympathy is that whenever a bad result follows an operation (where of course normally no such bad result occurs) it is presumed by the courts that the reason for the bad result must be some negligence on the part of the operating surgeon and therefore a lay jury is entitled to weigh the defendant-doctor's explanation of his conduct against such presumption without proof by expert testimony from another doctor of just what the defendant-doctor did wrong. In this situation the lay jury is forced to speculate between the defendant-doctor's explanation and the natural sympathy for the injured patient—with disastrous results to the defendant-doctor.

An interesting example of this occurs in "The Case of the Missing Uvula," a favorite vehicle for malpractice cases.[72] The medical facts are almost always the same. The lawsuit is filed alleging that several years before the defendant-surgeon performed a tonsillectomy and adenoidectomy in which he, without consent, removed the patient's uvula. The defendant-surgeon has performed so many routine T and A's since he barely recalls the case but a check of his records and the hospital records reveals merely a routine case with uneventful recovery. Post-lawsuit medical examination of the child is had, which reveals that, sure enough, the uvula is now missing. While it is always possible for a surgeon to inadvertently snare out the uvula during such an operation, it is a rare occurrence and the defendant-surgeon is adamant that he did not do so. Should *res ipsa loquitur* apply? Yes, said the Supreme Court of California:[73]

> So far as an understanding of the operation involved herein is concerned, it would appear to be a matter of common knowledge that the removal of a portion of the soft palate and of the uvula is no part of a tonsillectomy. The location of the tonsils is a matter which is easily observable to anyone, and the location and function of the uvula and soft palate are matters of common knowledge, and of which the court can take judicial notice.

But is this a matter of common knowledge? After a rash of such lawsuits we went into "The Case of the Missing Uvula" rather carefully and discovered that the contraction of scar tissue at the site of each tonsil following this operation sets up a transverse force which tended to stretch the soft palate outward in each direction from its center, which force, over a period of time, simply stretches the uvula out of existence. This was borne out by the fact that in none of our lawsuits did the patient exhibit any evidence of scar tissue at the site of the alleged surgically amputated uvula. (In subsequent malpractice lectures we suggested that the surgeon protect himself against the case of the missing uvula by charting the fact in the hospital record that subsequent to the operation and prior to discharge the throat was inspected and the uvula was intact.) It was further borne out by the medical literature,[74] one of which forewarned of possible malpractice litigation.[75]

> Atrophy of uvula.—We have seen two or three cases, and heard of others, where there was no suspicion of traumatism of any kind to the uvula, during operation, and it was seen to be intact and unimpaired before the patient left the table. Yet within ten to twenty days, the uvula has, without any appearance of bruising, traumatism, swelling or inflammation, quietly shrunk, and atrophied to a small, wasted prominence, or entirely disappeared. In one case, there was slight cleft-palate speech for a time, but this disappeared.
>
> It is well to note this possibility, as medico-legal action might be concerned with it.

What then is to be said for the case of the missing uvula? Is it fair to apply the doctrine of *res ipsa loquitur?* Plaintiff was unconscious, the defendant surgeon was in control, normally the uvula is not removed, yet plaintiff has lost her uvula. From the facts of the missing uvula is it fair to the surgeon to raise an inference that he was negligent and thus hurl him into the lion's den of jury speculation and permit the lay jury to speculate, without any appreciation whatever of the medical facts involved? We submit that it is not. For the basic requirement of *res ipsa loquitur* has not been met, namely that the injury is such that it would not have occurred unless the surgeon in control was negligent. Regardless of the skill of the surgeon, scar tissue will form and will contract. To permit a lay jury to speculate about such highly medical facts is to convert the doctrine of *res ipsa loquitur* into the rule of sympathy for the unconscious patient.

Very recently a trial court in California applied *res ipsa loquitur* to a vascular surgeon and a hospital in a case of transverse myelitis following translumbar aortography.[76] At the trial it was difficult to establish what in fact caused the paralysis, as there is very little in the literature concerning such a complication, although a few have been reported. It was the defendant-doctor's opinion, and that of another expert, that there had been an occlusion of the blood supply to the spinal cord, which resulted in necrosis of the cord. The third expert, a neurosurgeon, was of the opinion that the complication was due to a toxic reaction to the drug.

There was no direct testimony that standard practice was not followed either by the hospital and its employees or by the defendant-doctor. An independent medical expert called on behalf of the plaintiff to testify was not permitted to express an opinion on the standard practice in the community in the performance of aortography, on the ground that he was not qualified in the field. The defendant-doctor had performed 50 such aortograms with no untoward results.

The trial court denied defendants' motion for a nonsuit and directed verdict on the theory that the doctrine of *res ipsa loquitur* was applicable and submitted the case to the jury on this doctrine. The court did not require proof of negligence by the plaintiff. In applying the doctrine of *res ipsa loquitur* to the case, the trial court instructed the jury that there was a presumption or inference of negligence from the untoward result, which it was incumbent upon the defendants to explain away. The trial court's instructions, in effect, made the attending physician responsible for practices with untoward results, even though he was not in attendance at the time.

The jury rendered a verdict in favor of plaintiff against both defendants in the sum of $250,000. This was reduced by the trial court to approximately $215,000 and the case is now on appeal by both defendants.

The action of the trial court in applying the doctrine of *res ipsa loquitur* to this situation and thus permitting the plaintiff to submit his case to the jury without medical proof of negligence in the application of the aortography, places upon the defendant-doctor the burden of becoming an insurer of a vitally needed, but delicate diagnostic aid where an unfavorable complication may of course occasionally occur even in the presence of the highest degree of care. As a Pennsylvania Court remarked:[77]

> It is necessary for those engaged in the medical profession to constantly employ dangerous agencies, like electricity, radium, surgical instruments, poison, anesthetics, etc., and if prima facie liability attaches for an accident resulting from the use of one, logically, it should from the use of any other, and the practitioner employing such would be practically an insurer of the safety of his patients, which the law declares he is not. The question of liability does not hinge upon the dangerous character of the agency employed, but upon the manner of its use, as to which the presumption of due care is in favor of the practitioner, until overcome by evidence to the contrary.

One has to sympathize with the defendant-doctor! The risk of $250,000 is too great a one for him to be asked to assume. If this is to become the law, it is apparent that the patient and the progress of medical science—not the doctor—are to be the losers. Under the pressure of such odds, the doctors will simply cease to employ such techniques regardless of their benefit to the patient and regardless of the fact that, statistically, serious complications are rare.

One court long ago perceived this and in refusing to apply *res ipsa loquitur* to an untoward result (glaucoma developing subsequent to cataract operation) said: [78] "If the maxim 'res ipsa loquitur,' were applicable to a case like this, and a failure to cure were held to be evidence, however slight, of negligence on the part of the physician or surgeon causing the bad result, few would be courageous enough to practice the healing art, for they would have to assume financial liability for nearly all the 'ills that flesh is heir to'."

We are informed that the medical profession is already retrenching along this line, foregoing many useful techniques for fear of court and jury imposing tort liability without fault, through this doctrine of *res*

*ipsa loquitur*. In fact, malpractice litigation is now considered by the medical profession as a serious occupational hazard.[79]

## Conclusion

We have examined in some detail the cases of one jurisdiction—namely California—in order to show the recent trend towards liberalization and extension of the doctrine of *res ipsa loquitur* far beyond its original purpose to the dangerous point of a "rule of sympathy" wherein an untoward result is the only proof required to force the defendant-doctor to run the gauntlet of jury speculation, with disastrous consequences approaching financial ruin. This trend appears in other states as well,[80] (although California seems to have gone the farthest in this direction) but fortunately so far has remained a distant minority view. However, inroads are being made[81] upon the sound principles of the law protecting the medical profession from the evils of jury speculation and resultant liability without fault; pressure groups[82] are exerting influence upon courts and legislatures alike to relax and abolish these safeguards of the law. The time has come to exert an organized and effective pressure upon both courts and legislatures in defense of the rule requiring proof of negligence by expert testimony in malpractice cases.

To do so will be to defend not only the medical profession but also the rights of the public, for, if this trend continues, it is the public, as potential patients and beneficiaries of the advancement of medical science, that will suffer. For the medical profession cannot be asked to underwrite the cost of the advancement of medical science at the risk of personal financial ruin. As an English court has said:[83]

> We should be doing a disservice to the community if we imposed liability on hospitals and doctors for everything that happens to go wrong. Doctors would be led to think more of their own safety than of the good of their patients. Initiative would be stifled and confidence shaken. A proper sense of proportion requires us to have regard to the conditions in which hospitals and doctors work. We must insist on due care for the patient, but we must not condemn as negligence that which is only misadventure. . . .

It is easy to accuse; it is difficult to defend. The safeguard of the law that "he who affirms must prove" and, in malpractice cases "must prove actual negligence by expert testimony," is sound and should be preserved. To do otherwise is to force the medical profession into the role of insurers, a burden which it cannot and will not bear, with the resultant loss of useful techniques and retardation of the progress of medical science. Ultimately, this loss will fall upon the patient himself—who sooner or later may be any one of us.

## Caveat

While the medical profession can justly complain that the courts have gone too far in converting the doctrine of *res ispa loquitur* into a rule of sympathy, thus forcing the defendant-doctor to run the gauntlet of speculation by a lay jury ignorant of "the medical facts of life," there is one aspect of this problem that perhaps bears mention if the medical profession in turn is to understand "the legal facts of life" confronting the courts and the entire legal profession. Occasionally there is a justified malpractice lawsuit. Some doctor was negligent and from that negligence there arose an injury. Such a patient deserves redress. She is entitled, if justice means anything, to her day in court. Yet when she turns to the courts she finds the door to recovery barred by the safeguards of the law, that she who affirms must prove, and in malpractice cases must prove by expert medical testimony. When she reaches for that key, the medical expert, she finds difficulty in persuading any competent doctor to give testimony against a fellow-doctor in any malpractice lawsuit. Deprived of the key, she must batter at the door as best she can hoping to find a way to make it yield. Courts are keenly aware of her dilemma.

Such a dilemma arose on the following rather unusual medical facts:[84]

> Mrs. E. was pregnant with twins. . . . Dr. W. . . . delivered her of one of the children, but did not deliver the other. . . . Immediately after the birth of the first child, some neighbors . . . noticed a 'large mass or knot' in the upper part of her abdomen.
>
> . . . Mrs. E. was brought to . . . Hospital.
>
> She remained at said hospital . . . eleven days. . . . The treatment prescribed and administered consisted of enemas, hot packs on her abdomen, and sedatives. The mass in her abdomen . . . was very noticeable, and her suffering was intense.
>
> Defendants diagnosed her trouble as inflammation, tumor, locked bowels, and gas on the stomach. . . . At the end of that time she was removed to her home, and was told . . . that such treatment should be continued. . . .
>
> She was brought to the . . . Sanitarium . . . decided to be a case requiring immediate surgery, but, on account of her condition, she had to be toned up . . . operation . . . more than a gallon of pus and liquid was drained from her abdomen and the dead fetus was discovered, and removed. It was also shown that the uterus had been ruptured. The fetus was in a badly decomposed condition, and she remained in the hospital for about a week and died. . . .
>
> . . . . hospital had an x-ray machine . . . . x-ray would have shown whether the patient was afflicted with a tumor or that there was a fetus in her abdomen; . . . fetus was a female, fully developed and ready for parturition.

The trial court directed a verdict for the defendant-doctors on the plaintiff's failure to produce medical testimony. But this was too much for the reviewing court, which, in reversing and remanding for a new trial, said:[85]

> When it was shown that the use of the x-ray would more than probably have disclosed the nature of the lump, and shown that it was a dead fetus, then there was no necessity for a doctor to say that the failure to use the x-ray was negligence. And we think the jury would have so held.
>
> They insist that this would have been permitting the jury to 'speculate' as to what is or is not good practice and diagnosis, and that only an expert physician could so 'speculate'. If there had been a little more speculation by the doctors with reference to the nature of this lump prior to the time Dr. K. saw the patient, she would possibly have been alive today. Shortly after seeing the patient, he said that an abdominal operation was necessary. It is clear from the record that appellants were handicapped during the trial by the reluctance of physicians to testify with reference to the mistakes of other doctors. It is a matter of common knowledge that they have a rule, known as 'professional courtesy,' which is endemic in the medical profession, and with reference to this case it seems to have become an epidemic in that vicinity and was badly overworked. There were eleven prominent doctors listed on the hospital's stationery, including Dr. W., and from none of them was a sound ever heard. Even Dr. W. who was charged with malpractice, and a woman, failed to chirp. It was shown that Dr. K. was on his way to F.W. while the case was being tried. It is characteristic

of such testimony that it is so uncertain and unsatisfactory that little information may be gained from it. However, Dr. S. is a notable exception, and Drs. C. and K. on account of unfamiliarity with the facts in the case, were not able to give much information. These circumstances account, in some measure, for the failure of plaintiffs to fully develop their case, and require a reversal and remand.

Courts are human beings, swayed by natural sympathy for such a patient. In the face of the medical profession's unwillingness to furnish the key, the courts are finding a way to forge a key of their own to unlatch this door for the rightfully injured patient. That key is the rule of sympathy—an illogical but humanly understandable distortion of the doctrine of *res ipsa loquitur* beyond its original intended purpose, for it dispenses with the necessity of the medical expert. The danger to the medical profession is obvious. It runs the risk of being condemned for problems never rightly understood in cases completely unmerited if the medical truth were only known. As the Dean of the California Law School put it:[70]

"There was one very striking California case which some of you may have noted or heard about . . . which involved a most unusual application of the doctrine of res ipsa. The plaintiff went to a hospital for an operation for appendicitis. When he came out from under the ether, he had suffered a traumatic injury to his shoulder, apparently, so far as anyone can guess, brought about by some kind of strain or blow; and that was all the evidence. He brought an action joining several defendants. He joined the diagnostician who was present at the operation; the surgeon who performed the operation, the anesthetist who gave him the ether, the two nurses who were present and helped, two orderlies who took him back and forth between his hospital room and the operating room, and, of course, the superintendent of the hospital on general principles. No one of those defendants was in exclusive control of the situation. The court held that each of them had the burden of proving that he was not negligent. The court said that anyone who entrusted himself under those circumstances to the care of the medical profession for an operation in which his health, safety, or even his life might be involved, was entitled either to an explanation of what had happened or the payment of his damages. . . .

The other side of the picture is that res ipsa loquitur has been used at least in a fairly small number of cases to do something more than permit an inference from circumstantial evidence. It has been used, as it was used in that . . . case, to place upon the defendant the responsibility of producing evidence which is within his control and to compel that defendant to come forward with what he knows, or pay. The result in . . . does not make you altogether happy. All of those people were certainly not negligent. Some were entirely innocent persons who were not at fault, or who probably did not know what happened, yet had the verdict go against them. And yet when I consider the difficulties that I have sometimes encountered when representing the plaintiff in inducing any member of the medical profession to come forward with testimony in a malpractice case, I am not sure I am altogether dissatisfied with that result. I think in the next malpractice case in California there is going to be some testimony put in on the part of the defendant and that means that the plaintiff, at least, will have some chance of cross-examination, which is perhaps all he can ever ask for.

As was said by a California practicing attorney: [71]

"But it should be realized that res ipsa here is, in effect, two-fold: substituting not only for proof, but for the necessary expert evidence *usually impossible to obtain* and not required in the non-malpractice case."

The medical profession cannot have its cake and eat it too. This is a live and let live world. Justice is a two-way street. If the medical profession wishes to retain the safeguards of the law requiring proof of malpractice by medical testimony, it must make available to rightfully injured patients such medical proof in turn. Whatever the medical truth, patients are entitled to it too. For if the door is not unlocked by the one key, it most assuredly will be by the other. Perhaps this is a problem the medical profession will have to answer for itself. From the medico-legal point of view, in the face of astronomically rising *res ipsa loquitur* verdicts against defendant-doctors without proof of fault, some sort of answer would seem to be a necessity; from the long range public relations point of view, it would seem to be a virtue.

## Appendix

*Note.*—The following table represents a survey of medical malpractice cases wherein *res ipsa loquitur* was either applied or considered but rejected by the court from 1941 through 1955 inclusive, broken down into three five-year periods. The table is as inclusive as a reasonable search permits but does not pretend to be all-inclusive.

TABLE 1.—*Recent Trend*

| | 1941-1945 | | 1946-1950 | | 1951-1955 | |
|---|---|---|---|---|---|---|
| | Applied | Rejected | Applied | Rejected | Applied | Rejected |
| Alabama | | 1 | | 1 | | 1 |
| Arizona | | | | | 2 | |
| Arkansas | | 1 | | 1 | | |
| California | 1 | 2 | 3 | | 4 | 8 |
| Colorado | | 1 | | | | |
| Connecticut | | | | | | |
| Delaware | | | | | | |
| Florida | | | | | | |
| Georgia | | 1 | | | | |
| Illinois | | | | | | |
| Indiana | | | | | 1 | |
| Idaho | | | | | | |
| Iowa | | 1 | 1 | | | |
| Kansas | | | | | 1 | |
| Kentucky | | 1 | | 1 | | |
| Louisiana | | | | | 1 | |
| Maine | | | | | | |
| Maryland | | | | | | |
| Massachusetts | | 1 | | | | |
| Michigan | | | | | | |
| Minnesota | | 2 | | | | |
| Mississippi | | | | 1 | | |
| Missouri | | | | | | |
| Montana | | | | | | |
| Nebraska | | | | | | |
| Nevada | | | | | | |
| New Hampshire | | | | | | |
| New Jersey | | | | | | |
| New Mexico | | | | | | |
| New York | | | | | | |
| North Carolina | 1 | | | | | 3 |
| North Dakota | | | | | | 2 |
| Ohio | | | 1 | 1 | | |
| Oklahoma | | 2 | | | | |
| Oregon | | | | 1 | | |
| Pennsylvania | | | | | | |
| Rhode Island | | | | | | |
| South Carolina | | | | | | |
| South Dakota | | 1 | | | | |
| Tennessee | | | 2 | 1 | | |
| Texas | | | | | 1 | |
| Utah | | | | | | |
| Vermont | | | | | | |
| Virginia | | | 1 | | | |
| Washington | | | 1 | | | 2 |
| West Virginia | | | | | | |
| Wisconsin | | 1 | | | | |
| Wyoming | | 1 | | | | |
| Federal | | | | 1 | | 2 |
| Totals | 2 | 16 | 9 | 8 | 10 | 18 |

*Comment.*—The number of cases wherein *res ipsa loquitur* has either been urged upon the court by patients' attorneys but rejected by the court or been applied by the court has been steadily rising over the past 15 years.

## Medical Analysis of Res Ipsa Loquitur

*Note.*—The following tables represent a survey of reported medical malpractice cases wherein the doctrine of *res ipsa loquitur* has either been applied or considered but rejected by the court. The list is as inclusive as a reasonable search permits but does not pretend to be all-inclusive. To aid the doctor in locating his specialty, the cases are arranged by the medical specialty predominantly involved and by states under each medical specialty heading, so that the doctor can also easily locate his own jurisdiction.

TABLE 2.

| Specialty | "Res Ipsa Loquitur" Applied | "Res Ipsa Loquitur" Rejected | Total |
|---|---|---|---|
| Anesthesia | 1 | 5 | 6 |
| Diagnosis | 0 | 3 | 3 |
| General practice | 4 | 4 | 8 |
| Obstetrics | 3 | 1 | 4 |
| Ophthalmology | 0 | 1 | 1 |
| Orthopedics (nonsurgical) | 3 | 8 | 11 |
| Pediatrics | 1 | 0 | 1 |
| Psychiatry | 0 | 2 | 2 |
| Surgery | 32 | 29 | 61 |
| X-ray | 5 | 8 | 13 |
| Miscellaneous | 1 | 0 | 1 |
| Totals | 50 | 61 | 111 |

*Comment.*—It is interesting to note that out of 111 *res ipsa loquitur* involved cases, 66 or over 60% involved unconscious patients, and that in 50% of these 66 *res ipsa loquitur* was applied. Furthermore, by far the largest single medical group of cases involving the application of *res ipsa loquitur* came from the operating room where the patient is unconscious and therefore a fit subject for application of the rule of sympathy. When one bears in mind (1) that it is also the operating room that is most apt to yield an untoward result even in the face of the highest degree of care and (2) that the lay juror knows least about the complicated medical procedures there involved, these statistics become alarming and the injustice of the rule of sympathy apparent.

## Cases

### I. ANESTHESIA

**California**

*Res ipsa applied*
188 P. 2d 12 (Calif. 1947)

Where there is injury when explosion occurs within oral or nasal passages during removal of wart from nose with hot electric needle while under non-explosive anesthetic and before administration of ether, an explosive anesthetic, res ipsa applies against doctor and hospital.
291 P. 2d 915 (Calif. 1955)

Res ipsa applies only where laymen would know injury would not ordinarily occur if due care was used. Here temporary paralysis followed as result of spinal anesthetic given prior to childbirth.

**Missouri**

*Res ipsa rejected*
253 S.W. 156 (Mo. 1923)

Res ipsa does not apply where machine used to administer anesthetic explodes.

**Montana**

*Res ipsa rejected*
194 P. 488 (Montana 1920)

Res ipsa does not apply to malpractice case involving administration of anesthetic to intoxicated person causing death.

**Texas**

*Res ipsa rejected*
258 S.W. 2d 182 (Texas 1953)

Negligence in malpractice action must be proved by expert testimony. No proof that alleged negligence in administering spinal anesthetic resulted in paralysis of legs.

**Federal**

*Res ipsa rejected*
192 Fed. 2d 181 (C A 3 1951)

In action against surgeon and anesthetist for damages alleged to have been caused by nerve damage due to spinal anesthesia. Res ipsa does not apply because injury could have occurred though proper care was used and case is based on lack of skill in diagnosis, method or manner of treatment.

### II. DIAGNOSIS

**Alabama**

*Res ipsa rejected*
13 So. 2d 48 (Ala. 1943)

No res ipsa as to diagnosis and treatment by physician. Here death due to coronary occlusion following treatment of contusion of arm.

**California**

*Res ipsa rejected*
234 P. 2d 34 (Calif. 1951)

Res ipsa will not be applied where diagnostic problem not within common knowledge of laymen. Patient died due to blood clot after treatment of fractured skull received in automobile accident.

**Ohio**

*Res ipsa rejected*
113 N.E. 2d 373 (C A Ohio 1953)

Plaintiff claimed damage due to incorrect diagnoses and X-ray therapy. Court held res ipsa does not apply to cases of diagnosis and scientific treatment.

### III. GENERAL PRACTICE

**California**

*Res ipsa applied*
284 P 2d 133 (Calif. 1955)

Res ipsa applies to injury resulting from injection of drug into arm. Within knowledge of laymen, device in control of defendant.
241 P. 2d 684 (Calif. 1953)

Res ipsa applies to scars received due to warm compress treatment of leg resulting in burns.
192 P. 2d 771 (Calif. 1948)

Where doctor used silver nitrate pencil to mark veins to be removed and serious burns resulted, res ipsa is applicable against doctor. Doctor got pencil from hospital nurse who asked him if that was what he wanted and he said yes.

**Florida**

*Res ipsa rejected*
198 So. 208 (Fla. 1940)

Plaintiff claimed heat application of defendant in treating phlebitis caused ulcers on leg. Held: Res ipsa not applicable.

**North Carolina**

*Res ipsa rejected*
79 S.E. 2d 493 (N.C. 1954)

Res ipsa not applicable to alleged arsenic poisoning from medicine. No evidence that treatment not approved and acceptable.
1 S.E. 2d 889 (N.C. 1939)

Res ipsa not applicable in suit for injuries as result of unexpected and unfavorable result of doctor's treatment in using local anesthetic in circumcision allegedly containing caustic chemicals.

**North Dakota**

*Res ipsa rejected*
216 N.W. 569 (N.D. 1927)

Res ipsa does not apply where leg is lost as result of treatment of injured foot with tourniquet on leg.

**Rhode Island**

*Res ipsa applied*
83 A. 82 (R.I. 1912)

Where drain was left in incision in breast and allowed to remain after wound healed, defendant must come forth and show it was not due to negligence.

## IV. OBSTETRICS

**California**

*Res ipsa applied*
302 P. 2d 86 (Cal. D.C. of App. 1956)

Trial court applied res ipsa loquitur to sponges left in uterus following delivery, but verdict of jury was for defendant. District Court of Appeals affirmed the verdict.

**Tennessee**

*Res ipsa applied*
230 S.W. 2d 659 (Tenn. 1950)

Res ipsa is applicable when patient, unconscious after birth of child and in exclusive control of hospital, received serious injury, including fracture of humerus in left shoulder, and compression of eighth thoracic vertebra. But where all facts are brought out and nothing left to inference, it cannot apply.

**Utah**

*Res ipsa rejected*
83 P. 2d 1021 (Utah 1938)

Res ipsa is not applicable to death of mother following childbirth due to alleged negligence of physician.

**Virginia**

*Res ipsa applied*
43 S.E. 2d 882 (Va. 1947)

Res ipsa applies where baby was burned between time it left delivery room and time of discovery of burn the next day, during which time it was in possession of hospital and hospital didn't know how it happened.

## V. OPHTHALMOLOGY

**Massachusetts**

*Res ipsa rejected*
187 N.E. 829 (Mass. 1933)

Res ipsa does not apply when ulcer developed after doctor put unidentified liquid in eye.

## VI. ORTHOPEDICS

**Alabama**

*Res ipsa rejected*
61 So. 2d 690 (Ala. 1952)

Plaintiff broke her leg. Leg was set by defendant. She was dissatisfied with defendant and another doctor reset it three weeks later. Knee cap had to be removed later. Held: Res ipsa does not apply just because treatment had an unsuccessful result.

**Arkansas**

*Res ipsa rejected*
119 S.W. 2d 529 (Ark. 1938)

Res ipsa not applicable to medicine and surgery. Here there was an infection resulting from tight cast on arm.

**California**

*Res ipsa rejected*
149 P. 2d 69 (Calif. 1944)

Res ipsa does not apply where lamp globe explodes during treatment with big infra-red heating lamp.
133 P. 2d 425 (Calif. 1943)

Res ipsa does not apply to malpractice action where burns resulted from diathermy treatment for sprained ankle, since not within common knowledge of laymen.

**Iowa**

*Res ipsa rejected*
297 N.W. 301 (Ia. 1941)

Res ipsa does not apply where defendant treated for broken hip and leg and failed to heal.

**Kentucky**

*Res ipsa rejected*
210 S.W. 2d 946 (Ky. 1948)

Res ipsa does not apply to malpractice cases. Plaintiff must prove case by expert testimony unless within common knowledge of laymen. Doctor failed to X-ray leg after reducing a fracture.

**Minnesota**

*Res ipsa rejected*
276 N.W. 801 (Minn. 1937)

Res ipsa does not apply where pressure sore on foot results from Whitman cast treatment of fractured femur near hip socket.

**North Carolina**

*Res ipsa applied*
197 S.E. 701 (N.C. 1938)

Res ipsa applies where patient went to hospital with fractured fibula and defendant set the bone, did not see patient again for seven days during which time leg swelled, abscessed and burst. Applies in cases other than foreign substances during operations.

**Ohio**

*Res ipsa applied*
94 N.E. 2d 706 (Ohio 1950)

Expert testimony not always necessary in malpractice, evidence may warrant inference of negligence as where physician failed to properly reduce the fracture and permitted it to become infected and otherwise failed to take proper care of it during the period of convalescence.

*Res ipsa rejected*
103 N.E. 2d 13 (Ohio 1951)

Plaintiff broke hip bone. Went to hospital. Defendant called in by family doctor to set bone. Performed operation of hip pinning. Plaintiff burned by chemicals. Directed verdict for defendant affirmed. No control of chemical by defendant.

**Tennessee**

*Res ipsa rejected*
145 S.W. 2d 559 (Tenn. 1940)

Res ipsa does not apply where failure may have been caused by other than lack of care. Here leg bones did not set properly after treatment of fracture.

**Washington**

*Res ipsa applied*
221 P. 2d 537 (Wash. 1950)

Res ipsa applies where common knowledge of laymen would indicate that injury would not have occurred but for negligence. Here radius of left forearm was set by defendant and bones were not aligned so open reduction later necessary.

## VII. PEDIATRICS

**Arizona**

*Res ipsa applied*
239 P. 2d 591 (Ariz. 1952)

Though res ipsa not ordinarily applicable, where vaporizer used in treating baby's bronchial ailment was within exclusive control of defendant and facial burns resulted not due to baby's actions, and would not ordinarily occur in absence of negligence, res ipsa applies.

## VIII. PSYCHIATRY

**California**

*Res ipsa rejected*
254 P. 2d 520 (Calif. 1953)

Res ipsa not applicable where mentally incompetent adult sustains fracture during electroshock treatments.

**Tennessee**

*Res ipsa rejected*
192 S.W. 2d 992 (Tenn. 1946)

Res ipsa does not apply where hip was broken by electric shock treatment.

## IX. SURGERY

**Alabama**

*Res ipsa applied*
95 So. 167 (Ala. 1923)

Where needle is left in body after appendectomy, burden passes to defendant to show ordinary care.

*Res ipsa rejected*
25 S. 2d 264 (Ala. 1946)

No res ipsa in malpractice, plaintiff must show negligence. Plaintiff was treated for acute retention of urine due to stricture of urethra. A steel instrument used in treatment punctured the bladder.
147 S. 608 (Ala. 1933)

Res ipsa does not apply to death following tonsillectomy due to heart failure after anesthetic.

**Arizona**

*Res ipsa applied*
230 P. 2d 213 (Ariz. 1951)

Where plaintiff was operated on by defendant for extra-uterine pregnancy and cloth sack was found in area later res ipsa will apply.

**California**

*Res ipsa applied*
64 P. 2d 409 (Calif. 1936)

Where sponge was left in abdomen after gall bladder operation, res ipsa will be applied.
260 P. 2d 997 (Calif. 1953)

Res ipsa applies against all surgeons and hospital where needle is left in abdomen after operation to remove part of stomach. Principal and assistant surgeon by resident surgeon.
277 P. 134 (Calif. 1929)

Presumption of negligence arises from loss of tooth after adjustment of gag after administration of anesthetic for tonsil operation.
223 P. 2d 471 (Calif. 1950)

Res ipsa is applicable to surgeons and hospital where death occurs during tonsillectomy due to hemorrhage and accumulation of blood in lungs. Does not ordinarily occur and is within knowledge of laymen.
279 P. 2d 184 (Calif. 1955)

Where patient is in semi-conscious state following "major" operation and burn on stomach is discovered three days later, res ipsa applies against doctors, nurse and hospital. Test is right of control.
154 P. 2d 687 (Calif. 1944)

Where plaintiff had appendectomy and while unconscious received injury to arm res ipsa applies against doctors and nurses.

*Res ipsa rejected*
99 P. 2d 1044 (Calif. 1940)

Res ipsa is not applicable to blindness resulting from operation on eye after magnet failed to remove foreign body from eye.
231 P. 2d 108 (Calif. 1951)

Where operation for removal of varicose veins from testicle was performed and atrophy of testicle resulted, it was too complex for laymen so res ipsa does not apply.
257 P. 2d 756 (Calif. 1953)

Res ipsa not applicable in total hysterectomy operation since it is too complex for layman's inferences.
88 P. 2d 695 (Calif. 1939)

Res ipsa not applicable to operation to correct knee resulting in "foot drop". Rev.'d. application of res ipsa in 80 P. 2d 96.
281 P. 2d 272 (Calif. 1955)

Res ipsa applies only where common knowledge shows injury would not have occurred but for negligence. Here a facial infection followed plastic surgery.

**Connecticut**

*Res ipsa applied.*
138 A. 153 (Conn. 1927)

Where instrument broke during operation for removal of spur from nostril and defendant left piece in nose, expert testimony is not necessary to establish negligence.

**Florida**

*Res ipsa applied*
157 So. 328 (Fla. 1934)

It is negligence per se to leave sponge in abdomen incision after caesarian operation.
89 So. 2d 13 (Fla., 1956)

The Court refused to apply res ipsa loquitur to defendant engaged in removing moles from plaintiff's face by use of an electrically heated knife, which became dislocated and fell on plaintiff's neck burning it, stating that res ipsa loquitur does not apply since the injury may be due to negligence of the manufacturer of the knife.

**Idaho**

*Res ipsa applied*
26 P. 2d 796 (Idaho 1933)

Where needle is broken off and left in chest after lung tapping operation for pneumonia expert testimony is not necessary to establish malpractice.

**Indiana**

*Res ipsa applied*
183 N.E. 312 (Ind. 1932)

Where sponge is left in abdomen after operation for removal of tumor burden shifts to defendant to show absence of negligence.
106 N.E. 2d 108 (C.A. Ind. 1952)

Defendant performed operation to correct incisional hernia. Bowel of plaintiff cut during operation. Res ipsa should apply as unusual injury to healthy, unaffected organs located within field of operation.

Rev'd by 110 N.E. 2d 337—Sup. Ct. Ind. which held res ipsa loquitur did not apply to the situation.

**Iowa**

*Res ipsa applied*
154 N.W. 923 (Iowa 1915)

Where tongue is cut during operation to remove adenoids, that evidence is enough to send the case to the jury.
43 N.W. 2d 121 (Iowa 1950):

Where plaintiff alleges malpractice due to physician's operation on plaintiff's leg allegedly causing gangrene and requiring amputation res ipsa applies on general negligence where there is evidence that defendant ligated an artery rather than a vein.

**Kentucky**

*Res ipsa applied*
25 S.W. 2d 33 (Ky. 1930)

Res ipsa is applicable where burns are received from hot water bottle while plaintiff was under anesthetic for operation for appendicitis.

*Res ipsa rejected*
94 S.W. 2d 626 (Ky. 1936)

Res ipsa does not apply to malpractice, hence failure to cure does not create a presumption of negligence. Doctor failed to discover that peg used in hip pinning operation had moved into bladder.
160 S.W. 2d 6 (Ky. 1942)

Res ipsa not applicable in malpractice case. A needle was left in foot after an operation to repair an artery.

**Louisiana**

*Res ipsa applied*
61 So. 2d 901 (La. 1952)

Plaintiff claims defendant's oral surgeon and anesthetist caused tooth to drop into lung during extractions. Held, res ipsa applies though there are two defendants since something occurred that was unusual in such treatment but found that evidence established that both defendants had done all that reasonably careful practitioners, skilled in their respective professions, could have done, and that consequently there was no liability in either.

**Maryland**

*Res ipsa rejected*
124 A. 2d 265 (Maryland Court of Appeals, 1956).

Plaintiff alleged that defendant negligently severed facial nerve during mastoidectomy performed eleven years before, with paralysis appearing day after operation. The Court of Appeals affirmed the judgment for defendant holding that res ipsa loquitur did not apply in Maryland and plaintiff did not establish a case by expert testimony.

**Massachusetts**

*Res ipsa rejected*
159 N.E. 451 (Mass. 1928)
Res ipsa does not apply where sponge is left in after appendectomy is complete.

**Michigan**

*Res ipsa applied*
247 N.W. 911 (Mich. 1933)
Where needle is left in incision after appendectomy, it is negligence in absence of explanation of surgeon.

**Minnesota**

*Res ipsa rejected*
243 N.W. 67 (Minn. 1932)
Res ipsa does not apply to death following tonsil operation.
300 N.W. 791 (Minn. 1941)
No res ipsa where failures occur regardless of careful work. Clamps used in circumcision resulted in scars.
19 N.W. 2d 426 (Minn. 1945)
Res ipsa does not apply where burns might have been caused by other than hot water bottles during operation to repair tear in bowel.
268 N.W. 670 (Minn. 1936)
Res ipsa does not apply to malpractice. Expert testimony is necessary. An infection set in following a gall bladder operation.

**Mississippi**

27 So. 2d 889 (Miss. 1946)
Where only complaint is that child died shortly after tonsillectomy, res ipsa does not apply. No expert testimony.

**Missouri**

*Res ipsa applied*
99 S.W. 453 (Mo. 1907)
Res ipsa applies where plaintiff burned by nurses with hot water bottles while under anesthetic.
78 S.W. 2d 75 (Mo. 1934)
Where gauze was left in body after gall bladder operation, proof that it was left there is prima facie case.

**Montana**

*Res ipsa applied*
33 P. 2d 535 (Mont. 1934)
Res ipsa applies where there is burn on chest while unconscious for operation to remove appendix and fibroid tumor.

**New Jersey**

*Res ipsa applied*
174 A. 896 (N.J. 1934)
Where sponge is left in abdomen after incision for "important abdominal operation" is closed, case is for jury.
*Res ipsa rejected*
95 A. 995 (N.J. 1915)
Burden does not shift to defendant when plaintiff shows that gauze was left in abdomen after "surgical" operation.

**New York**

*Res ipsa applied*
237 N.Y.S. 611 (1929)
Presence of gauze pack in abdomen after operation to repair ruptured fallopian tube due to extrauterine pregnancy may give rise to inference of negligence. But, when defendant's expert witness stated that proper and approved methods were used in the operation, the possible inference of negligence because the gauze pack had been left in the abdomen was destroyed. Judgment for plaintiff was reversed and a new trial granted.
*Res ipsa rejected*
292 N.Y.S. 392 (1936)
No res ipsa against surgeon where hospital shared control. A tooth was found to be knocked out 24 hours after operation to remove adenoids.

**North Carolina**

*Res ipsa applied*
13 S.E. 2d 242 (N.C. 1941)
Res ipsa is applicable where two physicians leave gauze sponge in body after leg operation. Here proper inferences may be drawn by ordinary men.
166 S.E. 285 (N.C. 1932)
Res ipsa applies where injury is received during operation for fallen womb and while patient is unconscious.
*Res ipsa rejected*
88 S.E. 2d 762 (N.C. 1955)
Where defendant unsuccessfully operated to remove piece of metal and patient lost arm, res ipsa does not apply.

**North Dakota**

*Res ipsa rejected*
231 N.W. 278 (N. D. 1930)
Expert testimony is necessary to establish negligence where paralysis of face occurs after mastoid operation.

**Ohio**

*Res ipsa applied*
164 N.E. 518 (Ohio 1928)
Proof that sponge was left in abdomen after gall bladder operation is prima facie case.
*Res ipsa rejected*
88 N.E. 2d 76 (Ohio 1949)
Malpractice is a question for experts and can be established only by their testimony. Here bladder was cut during hysterectomy operation.

**Pennsylvania**

*Res ipsa applied*
86 A. 1007 (Pa. 1913)
Where proof shows gauze was left in incision after operation to relieve tubercular peritonitis, burden shifts to defendant to show that he was not negligent.

**Tennessee**

*Res ipsa applied*
205 S.W. 2d 759 (Tenn. 1947)
Res ipsa will apply if needle was put in body during appendectomy and wound closed without removing it, but will not serve to prove that needle went in during operation.
109 S.W. 2d 417 (Tenn. 1937)
Res ipsa will apply when sound and unaffected member eye is injured while patient unconscious and under exclusive control of surgeon for appendectomy but as it was not proven that plaintiff was injured while under defendant's control, court found for defendant.
*Res ipsa rejected.*
126 S.W. 2d 381 (Tenn. 1938)
Res ipsa will not apply where injury could have occurred regardless of care. Here facial paralysis followed mastoid operation.

**Texas**

*Res ipsa applied*
142 S.W. 2d 238 (Texas 1940)
Failure to remove a sponge after closing incision in "surgical operation" is negligence as matter of law.

**Washington**

*Res ipsa applied*
278 Pac. 181 (Wash. 1929)
It is negligence as matter of law to leave sponge in incision after bone transplant operation to immobilize injured back.
*Res ipsa rejected*
284 P. 803 (Wash. 1930)
Res ipsa is not applicable to bladder leak incurred after operation for removal of uterus.
258 P. 2d 472 (Wash. 1953)
Res ipsa does not apply to throat operation and patient's loss of voice since beyond knowledge of laymen.
266 P. 2d 792 (Wash. 1954)
Res ipsa will not be applied against doctor and hospital supply corporation where plaintiff suffered shocks from electric-surgical unit used in operation for prostatic resection.

**Wyoming**

*Res ipsa applied*
17 P. 2d 659 (Wyo. 1933)
Question as to whether sponge was left in body after appendectomy is for jury.

**Federal**

*Res ipsa rejected*
78 Fed. 442 (Gr. Ct. S.D. Ohio W.D. 1897)

Expert testimony is necessary to support a malpractice case for loss of eye after operation to cure "certain malady of eye."
*Res ipsa applied*
77 F. Supp. 706 (D.C. Md. 1948)

Court found that towel was left in body and by using res ipsa loquitur it inferred that there must have been negligence in leaving towel in body in the absence of any convincing evidence of the lack of negligence in doing so. Judgment was for defendant on grounds Federal Tort Claims Act did not cover case.

## X. X-RAY

**Arkansas**
*Res ipsa rejected*
186 S.W. 2d 779 (Ark. 1945)

Res ipsa does not apply to practice of medicine and surgery or use of X-ray. Here burn resulted from use of X-ray to locate needle in foot.

**California**
*Res ipsa rejected*
227 P. 2d 473 (Calif. 1951)

Res ipsa not applicable where condition may have been caused by forces other than negligent X-ray treatment for papillomae.
247 P. 2d 21 (Calif. 1952):

Res ipsa does not apply to burning by X-ray for treatment of carcinoma. Too complex for laymen.

**Indiana**
*Res ipsa rejected*
157 N.E. 456 (Ind. 1927)

Res ipsa does not apply to treatment by X-ray expert for eczema causing burns.

**Iowa**
*Res ipsa applied*
103 N.W. 360 (Iowa 1905)

Burns received from X-ray used in treatment of appendicitis are in themselves evidence of negligence.
*Res ipsa rejected*
232 N.W. 821 (Iowa 1930)

Res ipsa does not apply to burn resulting from X-ray treatment of ring-worm.

**Kansas**
*Res ipsa applies*
258 P. 2d 332 (Kan. 1953)

Res ipsa applies where defendant examined plaintiff's wart, advised its removal, assumed duty to remove it in proper manner, had exclusive control of X-ray and instrumentalities and yet plaintiff suffered severe burns on head and neck.

**Minnesota**
*Res ipsa applied*
136 N.W. 741 (Minn. 1912)

Res ipsa applies to burns received from X-ray pictures taken of plaintiff.

**North Carolina**
*Res ipsa rejected*
76 S.E. 2d 461 (N.C. 1953)

Res ipsa does not apply to X-ray treatment since injury could have occurred if proper care was used. Lesion on heel resulted from X-ray treatment of wart.

**Pennsylvania**
*Res ipsa applied*
12 A 2d 579 (Pa. 1940)

Inference of negligence may result where patient is burned as result of X-ray treatment since it does not normally happen. Not res ipsa exactly but a kindred rule. Injury due to a want of care.
*Res ipsa rejected*
124 A. 130 (Pa. 1924)

Mere happening of accident from use of X-ray machine does not create presumption of negligence. Burn followed X-ray pictures of teeth.

**Tennessee**
*Res ipsa applied*
7 S.W. 2d 808 (Tenn. 1928)

Res ipsa applies to burn caused by last X-ray treatment of 161 scattered over 6 years.

**Texas**
*Res ipsa rejected*
72 S.W. 2d 923 (Texas 1934)

Res ipsa does not apply to burns caused by X-ray treatment for favus.

## XI. MISCELLANEOUS

**Montana**
*Res ipsa applied*
7 P. 2d 228 (Mont. 1932)

Res ipsa applies where patient jumped from hospital window while delirious.

### Footnotes

1. This introduction, with but slight modifications, was taken from a recent article by the same author entitled "Medical Malpractice—A Changing Picture" originally published in the January 1956 issue of The Journal of The International Association of Insurance Counsel.

2. Newsweek Magazine, July 11, 1955; see also Footnote 3.

3. See 392 Ins. Law J. 614, Martin, W. F.: "Trial of Medical Malpractice Case."

4. Report of Medical Protective Society, Ltd., September, 1954. See also Footnote 3.

5. See infra, Footnote 62.

6. See Footnote 3.

7. (Circuit Court for Shelby County, Memphis, Tenn. Judge Wilson, October 15, 1952) not officially reported. See articles in Memphis Commercial-Appeal October 16, 1952, Memphis Press-Scimitar October 17, 1952, Arkansas Gazette (Little Rock) October 17, 1952.

8. 217 F. 2d 70 (U.S.C.A., 9th, 11-19-54). For opinion below, see: 111 F. Supp. 162 (U.S. D.C. N.D. Calif. 3-11-53).

9. 258 S.W. 2d 182 (C. of A., 4—6-53), rehearing denied, 5-11-53.

10. (Circuit Court, Milwaukee, Wis., 3-18-54, unreported.) See: The Milwaukee Journal, 3-19-54.

11. See Footnote 67.

12. See Footnote 4.

13. 20 American Jurisprudence, 138 Evidence, Sec. 135, Burden of Proof.

14. 192 F. 2d 181 (U.S.C.A. 3rd Cir., 1951); 78 F. 442 (Cir. Ct., S.D. Ohio, W.D., 1897); 158 F. 2d 969 (U.S.C.A. 6th Cir., 1947); 88 N.E. 2d 76 (Ohio, 1949).

15. 92 N.E. 2d 393 (Ohio, 1950); 91 N.E. 2d 256 (Ohio, 1950).

16. 193 N.E. 401, 404 (Ohio, 1934).

17. 164 N.E. 518, 520 (Ohio, 1928).

18. 154 N.W. 923 (Iowa, 1915); 94 N.E. 2d 706 (Ohio, 1950); 185 N.E. 210 (Ohio, 1933); 135 P. 235 (Wash., 1913).

19. 136 N.W. 741 (Minn., 1912). When injury occurs in diagnostic use of x-ray, majority of courts hold *res ipsa loquitur* applicable but for injury occurring during therapeutic use of x-ray, the courts are divided on the applicability of *res ipsa loquitur*. See discussion in 152 A L R 638.

20. 247 N.W. 911 (Mich., 1933).

21. 4 Cal. 2d 68 (Cal., 1935).

22. 185 N.E. 210 (Ohio, 1933).

23. 2 H & C 722 (1863); 1159 Eng. Rep. 299. Barrel rolled out of warehouse window and fell on passing pedestrian.

24. (Dissenting opinion of Bond, C. J.) 152 A. 633, 636 (Md., 1930).

25. Prosser on Torts, p. 291, Sec. 43, Parenthesis ours.

26. 41 N.E. 61, 61 (Mass., 1895).

27. 265 P. 238 (Cal., 1928).

28. 227 S.W. 631 (Mo., 1921).

29. 39 N.Y. 227. (N.Y., 1868).

30. 38 American Jurisprudence, P. 995, Negligence, Sec. 299.

31. Prosser—Law of Torts (2d Ed. 1955) p. 209. Circumstantial Evidence—Res Ipsa Loquitur "Courts frequently have said and occasionally have held that the doctrine cannot be applied unless evidence of the true explanation of the accident is more accessible to the defendant than to the plaintiff. It is difficult to regard this factor as anything more than a make weight, or to believe that it even can be controlling . . . if the facts give rise to no such inference, a plaintiff who has the burden of proof in the first instance could scarcely make out a

case merely by proving that he knew less about the matter than his adversary." Regan, L. J.: Doctor and Patient and the Law (3rd Ed. 1956) p. 214, 227.

32. See Footnotes 7 through 10.

33. See generally the following annotations or articles: 141 A.L.R. 5. Necessity of expert evidence to support an action for malpractice against a physician or surgeon. 152 A.L.R. 638. *Res ipsa loquitur* as applicable in case of injury by x-ray. 162 A.L.R. 1265. Physicians and Surgeons: presumption or inference of negligence in malpractice cases; res ipsa loquitur. 13 A.L.R. 2d 11. Proximate cause in malpractice cases. Regan, L. J.: Doctor and Patient and the Law (3rd Ed. 1956) pp. 214-229. Louis J. Regan—"Medical Malpractice" (1943), pp. 89-94. Hayt, Hayt, and Groeschel: Law of Hospital, Physician & Patient (2d Ed. 1952), pp. 448-9, 462, 466, 420.

34. 13 S.E. 2d 242, 244 & 245 (N.C., 1941).

35. 88 P. 2d 695, 697 & 698 (Cal., 1939).

36. See Footnote 33.

37. 88 P. 2d 695, 697 & 698 (Cal., 1939).

38. 154 P. 2d 687 (Cal., 1944).

39. 154 P. 2d 687, 688 (Cal., 1944). Comment: Just how Dr. C's x-ray film was able to reveal diminished sensation and muscle atrophy is unexplained.

40. 154 P. 2d at p. 689 (Cal., 1944).

41. All underscoring in quoted material represents the emphasis of the author of the article.

42. 164 N.E. 518, Syllabus Paragraph 1 (Ohio, 1928).

43. 70 Corpus Juris Secundum 989, Physicians & Surgeons Sec. 62, Evidence (a) Presumptions.

44. See Footnote 25.

45. 154 P. 2d. at p. 690.

46. Belli, M. V.: Modern Trials, Vol. 3, p. 1998, Medical Malpractice, Res Ipsa Loquitur.

47. 154 P. 2d at p. 689.

48. See Rules of American Hospital Assn. governing hospital records.

49. See 38 American Jurisprudence, p. 1005, Negligence—Res Ipsa Loquitur Sec. 308. And see 110 N.E. 2d 337. (Ind. 1953).

50. See Prosser Law of Torts (2d Ed. 1955) p. 216, Col. 2; See Regan, L. J.: Doctor and Patient and the Law p. 215 (Section 30 Res Ipsa Loquitur).

51. 38 American Jurisprudence p. 1001 Footnote 9 Negligence Sec. 304.

52. 110 N.E. 2d 337, 340 & 341 (Ind., 1953).

53. 88 N.E. 2d 76. (Ohio, 1949).

54. In 88 N.E. 2d 76, the jury was unable to reach any decision being bitterly divided into two groups concerning the question of whether or not the appearance of a vesico-vaginal fistula some four months after total hysterectomy in the patient described above (see Footnote 46) was due to the patient's claim that the defendant surgeon admitted afterward that "I nipped her bladder" or merely to a post-operative complication brought on by the weakening of the bladder wall by the pre-existing adhesions and surgery. The Court of Appeals entered final judgment as a matter of law in favor of the defendant-surgeon on the patient's failure to prove the defendant negligent by expert medical testimony. That the alleged admission "I nipped her bladder" will not supplant the need for expert testimony, see 284 P. 803 (Wash., 1930) in addition to 88 N.E. 2d 76.

55. 192 P. 2d 771, 772 (Cal., 1948).

56. 192 P. 2d 771, 773 (Cal., 1948).

57. 192 P. 2d 771, 776-7 (Cal., 1948).

57A. 188 P. 2d 12, 17 (Cal., 1948).

58. 281 P. 2d 278, 280 & 281 (Cal., 1955).

59. 281 P. 2d 278, 282 (Cal., 1955).

60. 281 P. 2d 278, 282, 283 (Cal., 1955).

61. 281 P. 2d 283, 284 (Cal., 1955).

62. 281 P. 2d 278 (Cal., 1955).

63. 291 P. 2d 915 (Cal., 1955).

64. 291 P. 2d 915 (Cal., 1955).

65. 291 P. 2d 915, 922, 923, 924 (Cal., 1955).

66. 188 P. 2d 12, 17 (Cal., 1948). Dissenting opinion of Traynor, J.

67. 192 F. 181 (U.S.C.A. 3rd Cir., 1951).

68. 192 F. 181, 183, 184 (U.S.C.A. 3rd Cir., 1951).

69. 192 F. 181, 184 (U.S.C.A. 3rd Cir., 1951).

70. 192 F. 2d 184, 185, 186 (U.S.C.A. 3rd Cir., 1951).

71. A distinction is made in some of the cases between an injury occurring to healthy tissue within the field of operation and healthy tissue outside of the operation field, the courts being more prone to apply *res ipsa loquitur* to the latter while requiring proof of negligence in the former on the theory that no lay juror can tell about events within the field of operation without the aid of expert testimony whereas any one knows that in an appendectomy operation the eye normally is not damaged. (See 109 S.W. 2d 417 [Tenn., 1937] where *res ipsa loquitur* was not applied because of plaintiff's failure to prove that plaintiff was injured while under defendant's control, the court indicating that if such proof had been supplied res ipsa loquitur would have been applied where sound and unaffected member of eye is injured while patient is unconscious and under exclusive control of surgeon for appendectomy) See 162 A.L.R. 1265 at pp. 1307-1320.

72. For other reported cases involving missing uvulas, see 194 N.W. 917 (N.D., 1923); 11 P. 2d 141 (Okla., 1932); 83 S.W. 2d 955 (Texas, 1935); 79 P. 2d 136 (Cal., 1938).

73. 79 P. 2d 136, 138 (Cal., 1938).

74. Froeschels, E.: Uvula and Tonsils, Arch. Otolaryng. **50:** 216-219 (Aug.) 1949. Diseases of Nose and Throat, Thomas and Negus, ed. 5, 1949, p. 451.

75. Thomas and Negus, "Diseases of The Nose and Throat" at p. 451. See Footnote 60.

76. Not yet officially reported. Defense attorney for the hospital was Joseph Rankin, Esq., Financial Center Building, Oakland 21, California. Defense attorney for the doctor was Howard Hassard, Esq., 111 Sutter Street, San Francisco 4, California. As of February 4, 1957, still awaiting appeal with briefs amicus curiae filed by The American College of Surgeons and the University of California.

77. 124 A. 130, 131 (Pa., 1924).

78. 78 F. 442, 443 (Cir. Ct., S.D. Ohio, W.D., 1897).

79. See article entitled "Malpractice, An Occupational Hazard," by the late Louis J. Regan, M.D. LLB, Journal of The American Medical Association, December 4, 1954.

80. In 109 S.W. 2d 417, 419 (Tenn., ). Involving injury causing loss of sight of eye during appendectomy) the Supreme Court of Tennessee said:

> ". . . We think a practical administration of justice dictates the application of the doctrine when it appears that a sound and unaffected member of the body is injured or destroyed while the patient is unconscious and under the immediate and exclusive control of the physician. In no other way under usual and ordinary conditions, could the patient obtain redress for such an injury, and it is no hardship upon the defendant to explain as he alone can, how the injury occurred."

And see 7 P. 2d 228 (Montana, 1932) applying res ipsa loquitur against hospital to case of patient jumping from hospital window while delirious.

81. Massachusetts: St. 1949, Apra. 18, c. 183, Sec. 1, amending G. L.
(Ter. Ed.) c. 233 ('A statement of fact or opinion on a subject of science or art contained in a published treatise, periodical, book or pamphlet shall, in the discretion of the court. . . . be admissible in actions of contract or tort for malpractice,' etc., 3 days notice before trial to adversary required). See Wigmore on Evidence-Vol. 6—1955 Pocket Supplement to Third Edition, page 4.

82. In September of 1955, the Conference of Delegates of the State Board of California adopted a resolution calling for the creation of a special committee to study and make recommendations on the matter of the rule requiring expert testimony in medical malpractice cases. The resolution further provided that the Special committee is to consult with "interested organizations"—some of which are dedicated to abolition of the rule. See Footnote 3.

83. Wooley and Roe v. Ministry of Health and others (1954) 1 W.L.R. 65. Also see Cassidy v. Ministry of Health (1951) 1 ALL E. R. 574. See also The Medical Legal Journal, part two, volume XXIII (1955) pages 40 through 46.

84. 89 S.W. 2d 801, 803 (Texas, 1935).

85. 89 S.W. 2d 801, 820 (Texas, 1935).

86. 16 Nevada State Bar Journal 51 at p. 69. Dean Wm. L. Prosser.

87. Belli, M. M.: Modern Trials Vol. 3 at p. 1996.

# MEDICAL NEWS

## ALABAMA

**John A. Andrew Clinical Society.**—The John A. Andrew Clinical Society's 45th annual meeting will be held in conjunction with the staff of the Veterans Administration Hospital, April 7-12, at the Tuskegee Institute of Alabama under the presidency of Dr. Ralph J. Young, Baltimore, Md. Lectures and clinics will be presented by specialists in internal medicine, psychiatry, anesthesiology, dermatology, and various other fields.

## GEORGIA

**Dr. Bartholomew Honored.**—The Aven Citizenship award cup for 1956 was recently presented to Dr. Rudolph A. Bartholomew, Atlanta, "for his devoted service in Civil Defense and his interest and advice on medical eare in times of disaster." In 1956, Dr. Bartholomew was requested to release for distribution a draft of his document on noncasualty medical care in times of disaster. Also, he developed a simple medical kit for prospective mothers to keep on hand and carry with them in the event of disaster evacuation. He prepared a manual in laymen's terms for distribution to all pregnant women through their private physicians, clinics, and health departments.

## ILLINOIS

### Chicago

**Lecture on History of Surgery.**—The seventh in a series of lectures on the history of surgery at the International Surgeons Hall of Fame, 1524 Lake Shore Dr., will be given by Dr. Max S. Sadove, professor of anesthesiology, University of Illinois College of Medicine, April 2, at 8 p. m., on "The Development of Surgical Anesthesia." Physicians, medical technicians, medical students, and the public are invited.

**School Health Week.**—By proclamation of Mayor Richard J. Daley, School Health Week will be observed in Chicago April 1-5. "Focus on Fitness" will be the theme of the program which is being developed under the auspicies of the joint committee on school health services of Chicago and a coordinating committee representative of all groups allied with this committee. According to the Mayor's proclamation, school health week will provide opportunity for parents, teachers, clergymen, schools, and cooperating health, allied and civic agencies to promote a concentrated educational program on the health of the school child. Dr. Helen C. Newman is chairman of the joint committee on school health services and Aaron Spitzer of the Welfare Council of Metropolitan Chicago is chairman of the coordinating committee in charge of school health week.

---

Physicians are invited to send to this department items of news of general interest, for example, those relating to society activities, new hospitals, education, and public health. Programs should be received at least three weeks before the date of meeting.

## INDIANA

**Hospital News.**—The new Community Hospital at 16th and Ritter streets, Indianapolis, recently held open house for the 300 corporation groups that participated in the 12 million dollar campaign, members of the Indianapolis Medical Society, and other interested persons. The superintendent of the hospital is Mr. Wilbur McLinn, formerly associated with Methodist Hospital in Indianapolis. Dr. Floyd A. Boyer is first chief of staff, Dr. Roy A. Geider, vice-president, and Dr. William H. Kelly, secretary-treasurer.

## IOWA

**Grants to University Professors.**—The State University of Iowa College of Medicine, Iowa City, announces the following grants from the U. S. Public Health Service, Institute of Arthritis and Metabolic Diseases, to: (1) Dr. William B. Bean, head, department of internal medicine, $45,000 a year for five years for support of the metabolism ward, to work on antivitamins; (2) Dr. Elmer L. DeGowin, professor of internal medicine, and Drs. Raymond F. Sheets and Henry E. Hamilton, associate professors of internal medicine, $20,000 a year for five years to study hemolytic mechanisms of human erythrocytes; and (3) Dr. Robert C. Hardin, professor of internal medicine, $8,000 a year for five years to continue his work in diabetes.

**Personal.**—Dr. John W. Eckstein, assistant professor, department of internal medicine, State University of Iowa College of Medicine, Iowa City, has received a three-year grant of $22,000 from the National Heart Institute of the U. S. Public Health Service for support of studies in venous physiology.——Dr. Norman B. Nelson, dean, State University of Iowa College of Medicine, Iowa City, has been elected a member of the board of directors of Central Life Assurance Co., Des Moines. Dr. Nelson was dean of medicine at the American University of Beirut, in Lebanon, for two years and assistant dean at the University of California School of Medicine at Los Angeles for four years.

**Coxsackie Infection in Iowa.**—According to Morbidity and Mortality, weekly report of the U. S. Department of Health, Education, and Welfare, the Iowa State Department of Health, division of preventable diseases, reported that up to Jan. 19, virus laboratory studies have confirmed the clinical diagnosis of 143 clinical and subclinical cases of Coxsackie $B_5$ infection in the state for 1956. Of these, 64 were originally reported as nonparalytic poliomyelitis. The Coxsackie isolations have been reported for 17 counties. Specimens submitted from at least 12 other counties are among those not yet reported.

The age distribution of persons from whom the Coxsackie virus has been isolated is similar to the age distribution for poliomyelitis. About two-thirds were in persons under 20 years of age. Recovery was com-

plete within one to two weeks after onset. The subclinical cases referred to were family contacts of known cases. Some had minor illnesses; others reported no illnesses. These persons were found because the investigative program called for the examination of family contacts of persons with known cases.

## KANSAS

**Appoint Professor of Surgery.**—Dr. Leonard F. Peltier, formerly associate professor and acting head of the orthopedic division at the University of Minnesota Medical School, Minneapolis, has been named professor of surgery and head of the section of orthopedic surgery at the University of Kansas School of Medicine, Lawrence—Kansas City. Dr. Peltier's appointment fills a vacancy occasioned by the death last April 30 of Dr. James B. Weaver, who had been associated with the school for 30 years.

## LOUISIANA

**Phi Delta Epsilon Lectureships.**—The Alpha Iota chapter of the Phi Delta Epsilon fraternity at Tulane University, New Orleans, will hold its fourth annual lectureship on April 4. Dr. Henry Falk of New York City will discuss "Urologic Injuries and Their Gynecological Management."

**Appoint Department Head.**—Dr. Charles Watkins was appointed professor and head of the department of psychiatry and neurology, Louisiana State University School of Medicine, New Orleans, effective Jan. 1, to replace Dr. Robert A. Matthews, who resigned.

## MARYLAND

**Camp for Cardiac Children.**—The Heart Association has a limited number of two-week camperships available for children, age 9-12 years, with a cardiac classification of 1A-11B. The camp is especially geared to the limitations a child may have. The cost of the two weeks is $50. A number of free camperships are also available. Campers must be referred by their physicians. Information may be obtained from the Heart Association of Maryland, 221 E. 25th St., Baltimore 18.

## MASSACHUSETTS

**Seminar on Antibiotics.**—Dr. Edward H. Kass of the Harvard Medical School, Boston, will present a seminar on antibiotics, March 27-28, at the Holyoke Soldiers Home in Holyoke.

**Apartments for Families of Resident Physicians.**—On Jan. 15, the Malden Hospital, Malden, dedicated an apartment building erected to house families of married resident physicians. Each of four apartments has a comfortable living room with abundant window space, kitchen, and bath; one apartment has a single bedroom; one has three bedrooms; the others have two bedrooms. All utilities, including an automatic clothes washer and dryer, refrigeration, electricity, and central gas heating are supplied. Ingenious planning has made it possible to swing an extra bedroom to either of the upstairs or downstairs apartments, depending on the size of the families occupying them.

**Grant for Nuclear Research at M. I. T.**—A grant of up to $250,000 from the Rockefeller Foundation has been received by the Massachusetts Institute of Technology, Cambridge, for medical treatment and research in the nuclear reactor now under construction at the institute. This sum is in addition to a grant of $500,000 from the National Science Foundation for construction of the reactor. The therapy room, which will, in effect, be a large and completely equipped operating room, is designed to serve all medical organizations in greater Boston and to be adequate for all applications that can now be foreseen for neutron and gamma ray therapy. An immediate use of the medical facilities will be treatment of cancer of the brain, in which the patient is given a boron compound, which moves through the body and concentrates rather selectively in the cancerous tissue in the brain. Thermal neutrons streaming through the aperture from the reactor penetrate the cancerous area and cause the boron to release alpha particles, which damage or destroy cancerous tissue in their path.

**Establish Aviation Health Center.**—Establishment of the Harvard-Guggenheim Center for Aviation Health and Safety at the Harvard University School of Public Health, in Boston, has been announced jointly by President Nathan M. Pusey, of Harvard University, and Harry F. Guggenheim, president of the Daniel and Florence Guggenheim Foundation. The new center will study responses of the human body to extreme speeds, altitudes, temperatures, and toxic agents in flight and on the ground, and carry on basic research in the prevention and control of the increasing dangers of the air age. The center, made possible by a grant of $250,000 from the foundation over a five-year period, will begin operation with the start of the 1957-1958 academic year under Ross A. McFarland, Ph.D. Two Daniel and Florence Guggenheim fellowships of $5,000 each will be awarded annually for graduate study at the new center. Applications for these fellowships are currently being received and considered. The Harvard-Guggenheim Center will serve three basic purposes: to unify basic research into the sharply increasing human problems of the jet era; to give advanced training to physicians, biological scientists, and aeronautical engineers; and to serve as a clearing house for technical information on aviation health and safety. Dr. McFarland, who will be the technical director of the center, is associate professor in the department of industrial hygiene He is winner of the 1956 John Jeffries award for "outstanding contributions to the advancement of aeronautics through medical research" and has written widely used textbooks on human factors in aviation.

## MICHIGAN

**Society News.**—The Michigan State Medical Society held a clinical institute March 13-15 in Detroit, devised to give physicians the latest in medical progress that can be used in everyday practice in their offices and hospitals.

A new film entitled "On Impact," a 15-minute documentary film on the prevention of automobile accidents was recently added to the Michigan State Medical Society public relations library. This film was produced by the American Medical Association in cooperation with the Ford Motor Company and it is available for loan to any member of the state society.

## MISSISSIPPI

**Dr. Guyton Honored.**—Dr. Arthur C. Guyton, physiology chairman, University of Mississippi School of Medicine, Jackson, has been awarded a certificate of meritorious service by the President's committee on the physically handicapped for work in research benefiting the handicapped.

**Personal.**—Dr. James D. Hardy, professor of surgery, University of Mississippi Medical Center, Jackson, was inaugural speaker at the establishment of the Horace Smithy Memorial Lectureship at Roper Hospital, Medical College of South Carolina, Charleston. His paper was entitled "Physiologic Treatment of Circulatory Collapse: Preoperative, Operative, and Postoperative."

## MISSOURI

**Meeting of Anesthesiologists.**—The annual meeting of the Missouri Society of Anesthesiologists will be held at the Muehlebach Hotel, Kansas City, March 31. Luncheon, 12:15 p.m. will follow the annual business meeting and precede the scientific program, which will include:

Electrolyte Replacement in the Surgical Patient, Morgan Stockwell, Kansas City.
Blood and Electrolyte Replacement in the Pediatric Surgical Patient, Daniel C. Darrow, Kansas City, Kans.
Plasminemia, Ray T. Parmley, Wichita, Kan.
Afibrinogenemia, Lauren R. Moriarty, Kansas City.

Physicians are invited. For luncheon tickets, contact Dr. Milton H. Noltensmeyer, 2826 Main St., Kansas City.

**State Medical Meeting in Kansas City.**—The 99th annual session of the Missouri State Medical Association will be held at the Municipal Auditorium, Kansas City, March 31–April 3, under the presidency of Carl F. Vohs, St. Louis. Presentations by out-of-state speakers will include:

Therapy of Malignant Lymphomas, Henry D. Diamond, New York City.
Diagnosis and Treatment of Common Skin Disorders, Sture A. M. Johnson, Madison, Wis.
Ovarian Carcinoma: Diagnosis and Treatment, Stuart Abel, Chicago.
Treatment of Cancer of the Cervix, Juan A. del Regato, Colorado Springs, Colo.
Surgical Considerations of Acquired Diseases of the Aorta: Analysis of 500 cases, Michael E. De Bakey, Houston, Texas.
Medical Problems of the Aging, Henry B. Mulholland, Charlottesville, Va.
Three-Fold Division of Medical Care Expenditures, Leonard W. Martin, Chicago.
Present Status of Anticoagulants, William T. Foley, New York City.

A panel on pediatrics is scheduled for 2:30 p. m. Monday and a panel, "The Multiple Injury Patient," for 11 a. m. Wednesday.

**Hospital News.**—The first electron microscope in a St. Louis hospital was recently installed at the Jewish Hospital of St. Louis medical center. Costing over $23,000, its purchase was made possible by research funds granted to the division of laboratories by the Ford Foundation. The instrument will be used in research. ——Dr. Leon Roizin, assistant professor of neuropathology (psychiatry) at Columbia University College of Physicians and Surgeons, New York, will address the staff of the VA Hospital at Jefferson Barracks, April 19, on demyelinating diseases of the central nervous system and histochemical findings in the central nervous system in presenile and senile psychoses.

## NEW YORK

**Dr. Childs Honored.**—Dr. Donald S. Childs, Syracuse, chairman, section of radiology, American Medical Association, was recently honored by the Radiological Society of North America, which gave him a silver tray in honor of his 25 years of service as secretary. The tray, engraved with the signatures of the past 25 presidents of the society, was presented to him at the recent annual meeting in Chicago. Dr. Childs is president of the American Board of Radiology.

**Annual Joachim Lecture.**—The 19th Doctor Henry Joachim Lecture will be given by Dr. W. Stanley Hartroft, chairman, department of pathology, Washington University School of Medicine, St. Louis, March 27, 8:30 p. m., in the Auditorium of the Private Pavilion of the Jewish Chronic Disease Hospital at Rutland Road and East 49th Street, Brooklyn. Dr. Hartroft will discuss "Fatty Livers and Sequelae in Experimental Animals and Man: Relation to Obesity, Alcohol and Dietary Protein."

**Technologists Meet in Syracuse.**—The Empire State Association of Medical Technologists (American Society of Clinical Pathologists), an affiliate member of the American Society of Medical Technologists, will hold its 10th annual state convention in the Hotel Syracuse, Syracuse, March 29–31. The theme of the convention, "Cells," will be propounded by Miss Geneva Daland, Boston, a hematology instructor at Harvard Medical School and chief technologist in hematology, Boston City Hospital and laboratory assistant in medical research at Thorndike Memorial Laboratory.

**Name Chairman of Anesthesiology.**—Dr. Charles M. Landmesser, Loudonville, associate professor of anesthesiology, Albany Medical College of Union University, has been named chairman of the department of anesthesiology at the college and anesthesiologist-in-chief to Albany Hospital, to succeed Dr. J. Gerard Converse, who resigned to accept a similar position at the University of Miami School of Medicine, Coral Gables, Fla. Dr. Landmesser was vice-president of the

New York State Society of Anesthesiologists in 1953 and has served as secretary-treasurer of the fourth district of the New York State Society of Anesthesiologists for the past four years.

**Society News.**—Officers of the New York Allergy Society now include: president, Dr. Samuel J. Prigal; president-elect, Dr. Leoni N. Claman; vice-president, Dr. Samuel Bell; secretary, Dr. Aaron D. Spielman, all of New York City; treasurer, Dr. Joseph H. Fries, Brooklyn; and assistant secretary-treasurer, Dr. Sheppard Siegal, New York City.——The New York County chapter, American Academy of General Practice, has elected the following officers for 1957: president, Dr. Joseph A. Pincus; vice-president, Dr. Harry K. Grottewit; secretary, Dr. Stanley H. Greenwald; assistant secretary, Dr. Michael C. Armao; treasurer, Dr. Morton M. Spielman; and assistant treasurer, Dr. Morris Amateau.

**Appoint Emeritus Professors.**—The State University of New York College of Medicine in Brooklyn has appointed Drs. Thurman B. Givan and Benjamin Kramer of the pediatrics department as clinical professors emeritus. Dr. Givan had been a member of the faculty of the college and its predecessor, the Long Island College of Medicine, since 1919. He has also been president of the Kings County Medical Society, New York State chairman of the American Academy of Pediatrics, and president of the Brooklyn Academy of Pediatrics and the Brooklyn Pediatric Society. Dr. Kramer joined the college of medicine, when it was the Long Island College of Medicine, in 1926. He was previously associate attending pediatrician at Johns Hopkins University School of Medicine, Baltimore, and pediatrician-in-chief at Jewish Hospital, Brooklyn. Dr. Kramer is president of the pediatric section of the New York Academy of Medicine.

## NEW YORK CITY

**Annual Karen Horney Lecture.**—The Association for the Advancement of Psychoanalysis announces the fifth annual Karen Horney lecture, "Psychotherapy of Schizophrenics," to be given by Dr. Frieda Fromm-Reichmann, Rockville, Md. The meeting will be on March 27, 8:30 p. m., in Hosack Hall at the New York Academy of Medicine, 2 E. 103rd St. A dinner honoring the guest speaker will precede the lecture.

## PENNSYLVANIA

### Philadelphia

**Personal.**—Dr. I. S. Ravdin, John Rhea Barton Professor of Surgery, University of Pennsylvania School of Medicine, has been made an honorary fellow of the Royal College of Surgeons, England. Dr. Ravdin delivered the Moynihan Lecture before the Royal College of Surgeons on "The Complexity of Liver Disease—Surgical Steps Toward Solution."

**Lecture on Medical Ethics.**—All medical students in the Philadelphia area are invited to a lecture on medical ethics sponsored by the Student Council of Jefferson Medical College (7:45 p. m.), March 28, in McClellan hall, Jefferson Medical College, 1025 Walnut St., Philadelphia. The speaker will be Dr. David B. Allman, Atlantic City, N. J., president-elect of the American Medical Association, whose subject will be "This Is My Code."

**University News.**—The Women's National College of Pennsylvania announces that Dr. Flora H. Biele has been promoted from associate to clinical assistant professor of neurology.——The Skin and Cancer Hospital of Philadelphia recently affiliated with the Temple University Medical Center as its dermatological division. The university will be responsible for the medical staff and the professional care of patients, and the hospital will continue to assume the financial and administrative obligations.

**New Center for Radiology.**—The University of Pennsylvania recently broke ground for the construction of the William H. Donner Center for Radiology. The Donner Foundation, established by the late industrialist, made a grant of $750,000 to the university to establish the center and to make possible the purchase of a megavoltage x-ray therapy apparatus for the treatment of deep-seated cancer. A megavoltage diagnostic generator has been obtained through support from the U. S. Public Health Service. A major activity of the center will be to train young men and women in the use of radiologic techniques. Physicians, chemists, and physicists will carry on research in radioactive isotopes, high energy radiation, and similar projects with special significance to the medical sciences. The new center will be connected with the present department of radiology of the University Hospital.

## UTAH

**Personal.**—Dr. Russell M. Nelson, a full-time member of the staffs of the University of Utah College of Medicine, and Salt Lake County General Hospital, Salt Lake City, was selected as Salt Lake City's "outstanding young man of the year" at a banquet sponsored by Salt Lake Junior Chamber of Commerce. He was cited for his work in developing a heart-lung machine that can be used to replace the function of the heart and lungs during a heart operation.

**General Practitioners Meet.**—The ninth annual meeting of the Utah chapter of the American Academy of General Practice will be held at the Hotel Utah, Salt Lake City, April 12-13. The scientific program will comprise a symposium on office practice presented by the following speakers: Drs. Carl A. Bunde, associate in pharmacology, Indiana University School of Medicine, Indianapolis; Louis A. Buie Sr., emeritus professor of proctology, Mayo Foundation Graduate School, Rochester, Minn.; Leslie V. D. Dill, associate professor of gynecology, Georgetown University, Washington, D. C.; Henry H. Dixon, head, department of psychiatry, University of Oregon Medical School, Portland; Peter H. Forsham, associate professor of pediatrics and medicine, University of California, San Francisco; George C. Griffith, professor of

medicine, University of Southern California, Los Angeles; Norman H. Jolliffee, director, nutrition clinics of the City of New York; Irving H. Leopold, professor of ophthalmology, Graduate School of Medicine of the University of Pennsylvania, Philadelphia.

The luncheon speaker will be W. E. Syers, consultant on business management and public relations to the Texas Medical Association, and the banquet speaker, Dr. John S. DeTar, national president of the American Academy of General Practice, Milan, Mich. There will be no registration fee, and the meetings are open to all members of the medical profession. The program chairman is Dr. Thomas E. Robinson, 2009 11th E., Salt Lake City.

## VIRGINIA

**Ophthalmology and Otolaryngology Congress.**—The Gill Memorial Eye, Ear and Throat Hospital, Roanoke, will hold its 30th annual spring congress in opthalmology and otolaryngology and allied specialties, April 1-6. Among many other speakers from various cities will be Dr. David B. Allman, Atlantic City, N. J., president-elect of the American Medical Association.

## GENERAL

**Congress of Anesthetists.**—The 31st Congress of Anesthetists will be held in conjunction with the International Anesthesia Research Society, April 1-4, at the Hotel Westward Ho, Phoenix, Ariz. For information write Dr. A. William Friend, 13951 Terrace Road, Cleveland 12, Ohio.

**Cardiovascular Seminar.**—The fourth annual cardiovascular seminar, sponsored by the Mississippi Heart Association, will be held at the University Medical Center in Jackson April 1-5. The program includes the following lecturers: Drs. H. Mitchell Perry Jr., associate professor of internal medicine, Washington University, St. Louis; Andre F. Cournand, director of the cardiopulmonary laboratory, Bellevue Hospital, Columbia University Division, New York City; Dr. Robert P. Glover, director cardiovascular research laboratory, Presbyterian Hospital, Philadelphia, Pa.; Dr. Robert F. Ziegler, chairman of the division of pediatric cardiology, Henry Ford Hospital, Detroit; Homer W. Smith, Sc.D., professor and chairman of physiology, New York University; and Dr. Denton A. Cooley, associate professor of surgery, Baylor University College of Medicine, Houston, Texas. The program will be arranged so that participating physicians who are unable to attend the full five days can select those days pertaining to their specialties or particular interests.

**Pediatricians Meeting in Washington, D. C.**—The American Academy of Pediatrics will hold its spring session April 1-3 at the Sheraton-Park Hotel, Washington, D. C. Among the program topics will be crises in early personality development, newly isolated viruses and virus vaccines, effects of radiation, adolescent medicine, controversial aspects of infant feeding, and mental retardation: the new pediatric challenge. There will be a special program on fitness of American youth Monday evening, April 1. In a panel discussion moderated by Dr. George Maksim, Washington, D. C., chairman, academy's committee on school health, the following will take part: Dr. Philip S. Barba, past-president of the academy and associate professor of pediatrics, University of Pennsylvania School of Medicine, Philadelphia; Ray O. Duncan, president, American Association of Health, Physical Education and Recreation, and dean, School of Physical Education and Athletics, University of West Virginia; and Mrs. Jenelle Moorhead, vice-president of National Congress of Parents and Teachers and professor of health education, University of Oregon. Individual papers will be presented at several scientific sessions. There will be exhibits and a program of entertainment. The banquet on Tuesday evening will be preceded by a reception and cocktail hour.

**Pan-American Association of Ophthalmology.**—This association will meet for its fourth interim congress jointly with the National Society for the Prevention of Blindness April 7-10 in New York City, with headquarters at the Hotel Statler. Addresses of welcome will be given by Dr. Francis B. Berry, assistant secretary of defense for medical affairs, Washington, D. C., and by Maj. Gen. Dan C. Ogle, surgeon general of the U. S. Air Force. Mayor Wagner, honorary president of the congress, has sent invitations to Latin American ophthalmologists. The scientific program beginning Monday morning includes three symposiums; addresses by ophthalmologists of South and Central America, Mexico, and Cuba; motion pictures; scientific exhibits; and surgical clinics. The official subjects and the moderators of the symposiums are Diseases of the Ocular Fundus, Drs. George N. Wise Jr. and John H. Dunnington, both from New York City; and Therapeutics in Present-Day Ophthalmology, Dr. Irving H. Leopold, Philadelphia. Dr. William L. Benedict, Rochester, Minn., secretary-treasurer, American Academy of Ophthalmology and Otolaryngology will speak for ophthalmologists of the United States, and Dr. Moacyr E. Alvaro, Sãn Paulo, Brazil, executive director, Pan-American Association, for those of Latin American countries. Dr. Girolamo Bonaccolto, 123 E. 61st St., New York City 21, is chairman of the committee on registration and housing. Hotel reservations should be made direct with the Hotel Statler, New York.

## CANAL ZONE

**Inter-American Medical Convention in Panama City.**—The Medical Society of the Isthmian Canal Zone, which has just celebrated its 50th anniversary, will sponsor the Second Inter-American Medical Convention at the Hotel El Panama, Panama City, April 3-5. The purpose of the meeting is to bring together leaders in various fields of medicine in Latin America and the United States to review the recent advances in medical research and clinical medicine. Among others, welcoming addresses will be presented by the president of the Republic of Panama, Ernesto de la Guardia Jr.; the governor of the Canal Zone, William E. Potter, and the president of the Isthmian Medical Association, Col. Charles O. Bruce. At the scientific session, among the speakers will be William F. Rienhoff Jr., professor of surgery, Johns Hopkins University, Baltimore, on "Carcinoma of the Lung"; Dr. Hawley H. Seiler, chief

of thoracic surgery service, Veterans' Administration Hospital, Tampa, Fla., "Surgery of Pulmonary Lesions Other than Cancer"; Chester W. Emmons, Ph.D., chief, laboratory of infectious diseases, Bethesda, Md., "Histoplasmosis"; Dr. Irving J. Selikoff, Mt. Sinai Hospital, New York, "Tuberculosis—Therapy and Trends"; Dr. Rupert B. Turnbull Jr., department of surgery, Cleveland Clinic, "Post-Operative Infections"; "Symposium —Mass Casualty Management," Col. Joseph R. Schaeffer, Philadelphia, chief, Atomic Research Center, Col. James E. Graham, Lt. Col. Robert D. Pillsbury; Dr. William A. Sodeman, chairman, department of medicine, University of Missouri College of Medicine, Columbia, Mo., "Amebiasis"; Dr. Carl M. Johnson, director, Gorgas Memorial Laboratory, Panama, "Leishmaniasis"; Col. Victor R. Hirschmann, chief of dermatology, Gorgas Hospital, "Moniliasis"; Dr. Joseph W. Kelso, professor of obstetrics and gynecology, University of Oklahoma School of Medicine, Oklahoma City, Okla., "Surgical Treatment of Cancer of the Uterus"; Dr. Juan A. Del Ragato, Penrose Cancer Hospital, Colorado Springs, Colo., "Status of Radiation Therapy in Treatment of Cancer of the Uterus"; Dr. Edward Shanbrom, City of Hope Medical Centre, Duarte, Calif., "Newer Aspects in Diagnosis and Treatment of Leukemia and Lymphoma"; Dr. Frank H. Stelling III, chief surgeon, Shriners' Hospital, Greenville, S. C., "Orthopedic Management of the Polio Patient"; Dr. Meredith F. Campbell, emeritus professor of urology, Bellevue and Post Graduate Hospitals, New York. "Obstructive Uropathies in Childhood"; Dr. Harold W. Brown, dean of school of public health, Columbia University, New York, "Visceral Larval Migrans."

## FOREIGN

**International Congress on Therapeutics.**—Utrecht, Netherlands, on June 4–6 1957, will be the meeting place of the Fifth International Congress of Therapeutics. Specialists from Switzerland, the United States, France, Holland, Canada, England, Belgium, and Italy are named in a tentative program that will feature especially the use of adrenal hormones, the treatment of diseases of the central nervous system such as parkinsonism and epilepsy, and the application of cytolytic and cytostatic drugs in the various forms of malignant lymphoma and other tumors. The sponsoring organization, the International Union of Therapeutics, asks that inquiries be addressed to the General Secretary's Office, Vondellan 6, Utrecht, Holland.

**Hematologists to Meet in Copenhagen.**—The Sixth Congress of the European Society of Hematology will take place August 26–31, 1957, in Denmark. The organizing committee, Dr. J. Bichel presiding, announces a comprehensive program on immunohematology, serum proteins and their cellular origin, fundamental aspects of hemorrhagic disorders, leukemia and myelofibrosis, and the properdin system. The International Society of Blood Transfusion is sponsoring symposiums on nonhemolytic transfusion reactions and on the treatment of transfusion reactions. Detailed programs and other information can be obtained by addressing Congress Service, Universitetet, Sct. Pederstraede 19, Copenhagen K, Denmark.

## EXAMINATIONS AND LICENSURE

AMERICAN BOARD OF ANESTHESIOLOGY: *Part I.* Various locations, July 19. Final date for filing application was Jan. 19. *Oral.* Asheville, No. Car., Mar. 24-29. Sec., Dr. Curtiss B. Hickcox, 80 Seymour St., Hartford 15, Conn.

AMERICAN BOARD OF DERMATOLOGY: *Written.* Several cities, June 27. *Oral.* Baltimore, Oct. 11-13. Final date for filing application is April 1. Sec., Dr. Beatrice Maher Kesten, One Haven Ave., New York 32.

AMERICAN BOARD OF INTERNAL MEDICINE: *Written.* Oct. 21. *Oral.* Boston, April 3-6. Final date for filing application was Jan. 2, Chicago, May 27-29; Los Angeles, Sept. 11-14. Final date for filing applications was Feb. 1. *Subspecialties. Gastroenterology.* Philadelphia, April 5-6. Final date for filing application is March 1. Exec. Sec., Dr. W. A. Werrell, 1 West Main St., Madison 3, Wis.

AMERICAN BOARD OF NEUROLOGICAL SURGERY: Examination given twice annually, in the spring and fall. In order to be eligible a candidate must have his application filed at least six months before the examination time. Sec., Dr. Leonard T. Furlow, Washington University School of Medicine, St. Louis 10.

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY: *Part II.* Chicago, May 15-25. Final date for filing application was Feb. 1. Sec., Dr. Robert L. Faulkner, 2105 Adelbert Road, Cleveland 6, Ohio.

AMERICAN BOARD OF OPHTHALMOLOGY: *Oral.* New York, May 23-27; Chicago, Oct. 7-11. Sec., Dr. Merrill J. King, Box 236, Cape Cottage Branch, Portland 9, Maine.

AMERICAN BOARD OF OTOLARYNGOLOGY: Chicago, Oct. 7-11. Final date for filing application is April. Sec., Dr. Dean M. Lierle, University Hospitals, Iowa City.

AMERICAN BOARD OF ORTHOPAEDIC SURGERY: *Part I.* Washington, D. C., Los Angeles and St. Louis, Mo., April 18. *Part II.* New York City, Jan. 29-31, 1958. Final date for filing application is August 15. Sec., Dr. Sam W. Banks, 116 South Michigan Avenue, Chicago 3.

AMERICAN BOARD OF PATHOLOGY: *Oral and Written. Pathologic Anatomy and Clinical Pathology.* Washington, April 4-6. Final date for filing application was March 1. Sec., Dr. Edward B. Smith, Indiana University Medical Center, Indianapolis 7.

AMERICAN BOARD OF PHYSICAL MEDICINE AND REHABILITATION: *Parts I and II.* New York City, June 8-9. Final date for filing application is March 1. Sec., Dr. Earl C. Elkins, 200 First St., S. W., Rochester, Minn.

AMERICAN BOARD OF PLASTIC SURGERY: *Entire Examination.* Philadelphia, May 4-6. Final date for filing case reports was Jan. 1. Corres. Sec., Mrs. Estelle E. Hillerich, 4647 Pershing Ave., St. Louis 8.

AMERICAN BOARD OF PREVENTIVE MEDICINE: *Oral and Written. Public Health.* Schools of Public Health, April 11-13. *Aviation Medicine.* Denver, May 9-11. *Occupational Medicine.* St. Louis, April 26-28. Sec., Dr. Thomas F. Whayne, 615 North Wolfe St., Baltimore.

AMERICAN BOARD OF PROCTOLOGY: *Oral and Written. Parts I and II.* September. Sec., Dr. Stuart T. Ross, 520 Franklin Ave., Garden City, N. Y.

AMERICAN BOARD OF PSYCHIATRY AND NEUROLOGY: New Orleans, Mar. 18-19. Final date for filing application was Sept. 10. New York, Dec. 16-17. Sec., Dr. David A. Boyd, Jr., 102-110 Second Ave., S. W., Rochester, Minn.

AMERICAN BOARD OF RADIOLOGY: Tampa, April 1-6. Final date for filing application was Jan. 1. Washington, Sept. 23-28. Final date for filing application is June 1. Within the near future a special examination for certification in Nuclear Medicine will be offered to diplomates in Radiology and Therapeutic Radiology. Application must be made before Feb. 15. Sec., Dr. B. R. Kirklin, Kahler Hotel Bldg., Rochester, Minn.

AMERICAN BOARD OF SURGERY: *Part II.* Boston, April 8-9, and New York, June 10-11. Sec., Dr. John B. Flick, 225 S. 15th St., Philadelphia 2.

BOARD OF THORACIC SURGERY: *Written.* Various centers throughout the country, September 1957, and the closing date for registration is July 1, 1957. Sec., Dr. William H. Tuttle, 1151 Taylor Ave., Detroit 2.

# GOVERNMENT SERVICES

## ARMY

**Nine-Month Military Medicine Course.**—The fifth class of military medicine and allied sciences presented annually by the Walter Reed Army Institute of Research will start Sept. 3. Its purpose is to develop highly qualified professional leadership at Army medical research, teaching, and treatment centers. Fifteen medical officers who have completed residency training in a specialty will be selected for the nine-month course. Basic mechanisms are to be studied, recent advances in the sciences examined, and correlation made between various areas of science.

The students will be guided into a broad pattern of many subjects by a resident and visiting faculty of governmental authorities and by lecturers from many American and European universities. Time will be spent on the medical aspects of radiation, radioisotopes, nuclear warfare, treatment of mass casualties, chemical and biological warfare agents, and certain global epidemiologic concepts of particular importance to military professional personnel. Half of the time will be devoted to research projects, which afford an opportunity to apply theoretical material to a practical purpose. A thesis must be completed and accepted before graduation on June 20, 1958.

Gen. Silas B. Hays said, "The increasing size and mobility of modern armies, the complexities of potential weapon effects and the world-wide nature of our responsibilities as a nation are placing more and more demands on the medical services of our Army. This means the individual medical officer must be prepared for any military medical situation anywhere on the globe. At the same time he must maintain the highest professional standards in his medical specialty. We think this course combines lectures, conferences and laboratory sessions useful to all specialties, to those officers concerned with research and to those planning an entirely clinical career."

A highlight of the class commencements is the awarding of the Hoff medal to the student who attains the highest class proficiency.

## NAVY

**Training Available for Reserve Officers.**—A 14-day course in medical military training is available at the Naval Medical School, Bethesda, Md., commencing March 11. This course has been revamped to bring it up to date on all aspects of military medicine. It is designed for the requirements of reserve medical department officers.

The first week will be devoted to the medical aspects of special weapons and radioactive isotopes and the second week to professional military medicine topics. Messing facilities are available. Bachelor officers' quarters are limited on a first-come-first-served basis. Public lodging may be obtained locally. Interested and eligible reservists should write the reserve medical program officer of their naval district for detailed information.

A reserve research nuclear science seminar whose theme will be "Life Sciences and Atomic Energy" will convene at the Brookhaven National Laboratory, Upton, N. Y., May 27. All eligible reserve medical department officers may attend this seminar within quotas authorized for naval districts 1, 3, 4, 5, 6, and 9, with priority being given to members of the reserve research program. Fourteen days active duty for training is authorized. Secret clearance is required and should be stated in the active duty for training orders.

Housing and messing is available at the Brookhaven laboratory, except in the case of officers who might bring their wives. In the latter case information on nearby motels and other outside accommodations will be furnished on request. Address requests for information to the Commanding Officer, Naval Reserve Research Company 3-9, Brookhaven National Laboratory, Upton, N. Y.

**Commendation for Rehabilitation Research.**—The bureau of medicine and surgery has been awarded a commendation by the President's committee on employment of physically handicapped for research and development in prosthetic devices. At the recent Parade of Progress and Exposition at Miami, Fla., the exhibit "New Developments and Research in Artificial Limbs" was displayed. Capt. Thomas J. Canty, director, prosthetic research laboratory, U. S. Naval Hospital, Oakland, Calif., accompanied the exhibit as did a number of amputees, who demonstrated their dexterity in the use of various prosthetic devices manufactured at the U. S. Naval Hospital.

## VETERANS ADMINISTRATION

**Personal.**—Dr. Edward H. Mandell, manager, VA Hospital, Saginaw, Mich., will become manager of the VA Hospital at Indianapolis to fill the vacancy created by the retirement of Dr. Earl H. Hare. Dr. Mandell will be succeeded at Saginaw by Dr. Russell E. Pleune, director of professional services at the VA Hospital in Madison, Wis.

## PUBLIC HEALTH SERVICE

**Federal Aid for Sewage Disposal.**—The Public Health Service announces that grants totaling $3,883,535 have been made to 60 municipalities to help build sewage treatment works under the new Federal Water Pollution Control Act. The 60 cities and towns, ranging from 280 to a quarter of a million in population, added $11,870,688 of their own funds to bring the cost of the sewage treatment facilities to a total of $15,754,223.

Last summer Congress authorized grants of 50 million dollars a year (up to an aggregate of 500 million dollars) for the construction of municipal sewage treatment works. It limited individual grants to $250,000, or 30% of the total cost of the project, whichever is less. To be eligible for federal funds, a municipal water pollution control project must be part of a comprehensive control program developed by the Public Health Service, other federal agencies, and state and interstate water pollution control agencies.

# DEATHS

**Kuntz, Albert,** St. Louis; born in Batesville, Ind., in 1879; St. Louis University School of Medicine, 1918; assistant professor of biology and histology at his alma mater in 1913 and professor of microanatomy from 1919 to 1946 and director of that department from 1930 to 1946, when he became professor and director of the department of anatomy; last November was presented with an Alumni Merit Award by the university; member of the Alpha Omega Alpha fraternity, of which he was secretary; member of Sigma Xi, Pi Gamma Mu, and Phi Chi, which in 1955 established an annual lectureship in his name; in 1937 president of St. Louis Academy of Science; vice-president of the American Association of Anatomists in 1938; author of the "Autonomic Nervous System," published in four editions, and "Neuro-Anatomy," published in five editions; author or co-author of more than 200 scientific papers, and prepared annually a review of current publications relative to the anatomy, physiology, and clinical aspects of the autonomic nervous system that appeared in "Progress in Neurology and Psychiatry"; author of two distinctive monographs titled "Visceral Innervation and its Relation to Personality" and "The Neuro-Anatomic Basis of Surgery of the Autonomic Nervous System"; died Jan. 19, aged 77, of coronary heart disease.

**Vicente-Mastellari, Amadeo,** Ancon, Canal Zone; born in Panama, March 21, 1907; George Washington University School of Medicine, Washington, D. C., 1931; member and served as president of the Medical Association of Isthmian Canal Zone; fellow of the American Academy of Allergy, American College of Physicians, American Public Health Association, American Trudeau Society, and the American College of Chest Physicians, of which he was a regent for Central America; honorary member of the Venezuelan Tuberculosis Society, the Guatemalan Tuberculosis Society, the Mexican Society of Tuberculosis, and the Tuberculosis Society of Cordoba, Argentina; technical advisor in tuberculosis of the Inter-American Public Health Service, Republic of Panama, and president of the Central American Tuberculosis Society; professor of phthisiology of the School of Medicine, National University of the Republic of Panama; chief of the chest service, Gorgas Hospital; director of the Anti-Tuberculosis Campaign of the Republic of Panama; corresponding associate editor of *Diseases of the Chest*; died Sept. 9, aged 49, of uremia, nephrosclerosis, and hypertension.

**Petersen, Ralph Clarence** ⊕ Glendale, Calif.; born in Seattle, Wash., July 23, 1907; Washington University School of Medicine, St. Louis, 1917; instructor in surgery (orthopedic) at the University of Southern California School of Medicine, Los Angeles; secretary-treasurer of the Glendale Branch of the Los Angeles County Medical Association; member of the American Academy of Orthopaedic Surgeons; specialist certified by the American Board of Orthopaedic Surgery; veteran of World War II; fellow of the American College of Surgeons; vice-president of the board of Behrens Memorial Hospital, where he was on the staff; on the staffs of the Childrens and Los Angeles County hospitals in Los Angeles, St. Joseph Hospital in Burbank, Glendale Sanitarium and Hospital, and the Physicians and Surgeons Hospital; died Dec. 25, aged 49.

**Bruner, Abram Breneman** ⊕ Cleveland; born in Columbia, Pa., in 1891; Columbia University College of Physicians and Surgeons, New York City, 1916; associate clinical professor of ophthalmology at Western Reserve University School of Medicine; specialist certified by the American Board of Ophthalmology; member of the American Academy of Ophthalmology and Otolaryngology, American Ophthalmological Society, and the Association for Research in Ophthalmology; fellow of the American College of Surgeons; past-president and vice-president of the Academy of Medicine of Cleveland; trustee and past-president of the Cleveland Medical Library; veteran of World War I; on the staff of the University Hospitals; died Jan. 9, aged 65, of coronary disease.

**Rood, Adolphus Duncan** ⊕ Lancaster, N. H.; University of Vermont College of Medicine, Burlington, 1908; served on the faculty of his alma mater; fellow of the American College of Surgeons; member of the Massachusetts Medical Society; for many years practiced in Springfield, Mass., where he was on the staffs of the health department, of the Mercy and Wesson Memorial hospitals, and of the Shriners' Hospital for Crippled Children; served on the staffs of the Westfield State Sanatorium and Noble Hospital in Westfield, as consultant at Mary Fletcher Hospital in Burlington, Vt., and the Cooley Dickinson Hospital in Northampton, Mass.; died in the Beatrice D. Weeks Memorial Hospital in Lancaster Dec. 28, aged 73, of bronchopneumonia.

**Salmon, Leon Arthur** ⊕ New York City; born in Brooklyn April 9, 1900; Columbia University College of Physicians and Surgeons, New York City, 1925; assistant professor of neurology (clinical) at his alma mater; specialist certified by the American Board of Psychiatry and Neurology; fellow of the American College of Physicians; member of the Association for Research in Nervous and Mental Diseases; consulting psychiatrist to the New York City Board of Education; associated with Kings County Hospital in Brooklyn; associate attending neurologist at the Vanderbilt Clinic and at the Neurological Institute; consulting neurologist at St. Francis Hospital in Port Jervis; died in the Harkness Pavilion for Private Patients, Unit of Presbyterian Hospital, Jan. 12, aged 56.

**Wexberg, Leopold Erwin** ⊕ Washington, D. C.; born in Vienna, Austria, Feb. 12, 1889; Medizinische Fakultät der Universität, Vienna, Austria, 1913; Louisiana State University School of Medicine, New

⊕ Indicates Member of the American Medical Association.

Orleans, 1936; specialist certified by the American Board of Psychiatry and Neurology; member of the American Psychiatric Association; since 1945 director of the bureau of mental hygiene, District of Columbia Health Department; director of the District of Columbia Alcoholics Rehabilitation Program; veteran of World War II; served on the staffs of the Hotel Dieu, Sisters' Hospital, of the Touro Infirmary, and of the Charity Hospital of Louisiana in New Orleans; author of many books; died Jan. 10, aged 67.

**Wicks, Frederick Lewis** ✱ Valley City, N. D.; born March 2, 1885; Keokuk Medical College, College of Physicians and Surgeons, Keokuk, Iowa, 1906; also a graduate in pharmacy; president of the Cheyenne Valley Medical Society; for 25 years secretary of the North Dakota Academy of Ophthalmology and Otolaryngology, of which he was founder; for 10 years member of the state board of medical examiners; past-president of the North Dakota State Medical Association, of which he was a councilor; recipient of selective service medal; served as chief of staff, Riverside and Mercy Hospitals; died Dec. 20, aged 71, of cerebral thrombosis and hypertensive cardiovascular disease.

**Butterfield, Paul William** ✱ Alpena, Mich.; born in East Wilton, Maine, April 23, 1909; Boston University School of Medicine, 1934; specialist certified by the American Board of Pathology; certified by the National Board of Medical Examiners; member of the College of American Pathologists and the American Society of Clinical Pathology; served on the faculty of the University of Vermont College of Medicine, Burlington, where he was pathologist at the Bishop DeGoesbriand Hospital; for many years on the staff of the Washington County Hospital in Hagerstown, Md.; on the staff of the Alpena General Hospital; died in St. Luke's Hospital, Chicago, Oct. 12, aged 47.

**McCampbell, Herbert Hook** ✱ Knoxville, Tenn.; born in Knoxville, April 29, 1875; University of Tennessee Medical Department, Nashville, 1898; specialist certified by the American Board of Radiology; member of the Radiological Society of North America and the American College of Radiology; past-president of the Knox County Medical Society; formerly member of the board of education; served in France during World War I; veteran of the Spanish-American War; on the staffs of the Knoxville General and St. Mary's Memorial hospitals; past-president of the Knoxville Rotary Club; died Jan. 15, aged 81, of hypostatic pneumonia and cerebral vascular accident.

**Losner, Samuel** ✱ Brooklyn, N. Y.; Friedrich-Wilhelms-Universität Medizinische Fakultät, Berlin, Prussia, Germany, 1937; interned at the Jewish Hospital; served a residency at the Jewish Sanitarium and Hospital for Chronic Diseases; clinical instructor in medicine at the State University of New York College of Medicine; assistant director of medicine and chief of the coagulation laboratory at the Jewish Sanitarium and Hospital for Chronic Diseases, where he died Jan. 14, aged 45, of myocardial infarction and arteriosclerotic heart disease.

**Scott, Walter Francis** ✱ Birmingham, Ala.; born Jan. 19, 1881; University of Virginia Department of Medicine, Charlottesville, 1904; professor emeritus of urology at the Medical College of Alabama; member of the Southern Surgical Association; fellow of the American College of Surgeons; past-president of the Medical Association of the State of Alabama; veteran of World War I; served for six years on the city council and later a member of the school board; died in St. Vincent's Hospital Dec. 15, aged 75, of ruptured abdominal aortic aneurysm.

**Randall, Alice Louisa,** Charleston, W. Va.; Medical College of Virginia, Richmond, 1928; certified by the National Board of Medical Examiners; fellow of the International College of Surgeons; for many years a medical missionary in India; received three decorations from the British government for outstanding work at the American Baptist Mission at Gauhati Assam, India, and with the Burmese people; on the staff of the Memorial Hospital; died Jan. 21, aged 60, of cerebral emboli.

**Smith, Herbert Johnson,** Philadelphia; Medico-Chirurgical College of Philadelphia, 1898; an associate member of the American Medical Association; specialist certified by the American Board of Dermatology and Syphilology; member of the American Academy of Dermatology and Syphilology; emeritus professor of dermatology at New York Polyclinic Medical School and Hospital, New York City; on the staff of the Graduate Hospital of the University of Pennsylvania; died Dec. 22, aged 85.

**Aldridge, James William,** Grandview, Texas; Fort Worth (Texas) School of Medicine, Medical Department of Fort Worth University, 1902; died Oct. 31, aged 87.

**Alexander, Jeremiah Smyth,** Omaha; Chicago Homeopathic Medical College, 1900; veteran of World War I; died Nov. 30, aged 75, of myocardial infarction.

**Altieri, John Angelo** ✱ Denver; University of Colorado School of Medicine, Denver, 1926; member of the American Academy of General Practice; veteran of World War II; died in St. Anthony Hospital Oct. 31, aged 54, of carcinoma of the sigmoid with metastases.

**Bitter, Arthur Henry** ✱ Quincy, Ill.; University of Pennsylvania School of Medicine, Philadelphia, 1918; fellow of the American College of Surgeons; certified by the National Board of Medical Examiners; past-president and secretary of the Adams County Medical Society; veteran of World War I; chief of St. Mary's Hospital and Blessing Hospital, where he died Nov. 25, aged 64, of coronary thrombosis.

**Brown, Eldridge Tracy,** Cleveland, Ala.; Vanderbilt University School of Medicine, Nashville, Tenn., 1917; member of the Medical Association of the State of Alabama; veteran of World War I; served on the staffs of the Blount Memorial Hospital in Oneonta and the

East End Memorial Hospital and South Highlands Infirmary in Birmingham; died in the Vanderbilt University Hospital in Nashville, Tenn., Dec. 10, aged 60, of cancer.

**Epple, Stephen Logan,** Galt, Calif.; Indiana University School of Medicine, Indianapolis, 1921; died Dec. 14, aged 73.

**Farley, Frank Jefferson** ✙ Dade City, Fla.; Rush Medical College, Chicago, 1940; on the staffs of the Duval Medical Center in Jacksonville, Tampa Municipal Hospital in Tampa, and the Jackson Memorial Hospital; died in Bushnell Dec. 1, aged 42, of exposure and cardiac arrest.

**Heathman, Frank Eugene** ✙ Pocahontas, Iowa; Keokuk Medical College, 1895; formerly practiced in Havelock, where he was mayor and president and secretary of the school board; for many years county coroner; past-president of the Pocahontas County Medical Society; on the staffs of the Lutheran Hospital and the St. Joseph Mercy Hospital in Fort Dodge, where he died Dec. 17, aged 86, after fracturing his hip in a fall.

**Killingsworth, William Milton,** Portland, Ore.; University of Oregon Medical School, Portland, 1907; member of the staff of the Physicians and Surgeons Hospital, where he died Dec. 23, aged 76, of carcinoma of the throat.

**Klann, William Alfred** ✙ Wellington, Ohio; Eclectic Medical College, Cincinnati, 1929; on the staff of the Allen Hospital, Oberlin College, in Oberlin; died Dec. 22, aged 50, of carcinoma of the right lung.

**Kunz, George Gilbert Roland** ✙ Tacoma, Wash.; Missouri Medical College, St. Louis, 1898; also a graduate in pharmacy; fellow of the American College of Surgeons; served on the staffs of St. Joseph's and Tacoma General hospitals; died in Dallas, Texas, Jan. 2, aged 80, of subarachnoid hemorrhage.

**Mace, John Lawrence** ✙ Hastings, Neb.; University of Tennessee Medical Department, Nashville, 1909; past-president of the Adams County Medical Society; died Dec. 12, aged 77.

**Ochsner, Thomas Stanley,** Santa Barbara, Calif.; University of Nebraska College of Medicine, Omaha, 1954; interned at Santa Barbara Cottage Hospital; died Nov. 28, aged 28.

**Ottersbach, Carl C.,** St. Louis; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1902; died in the De Paul Hospital Dec. 24, aged 80.

**Pallesen, Viggo Waldemar** ✙ Lodi, Calif.; College of Medical Evangelists, Loma Linda and Los Angeles, 1929; on the staffs of the Lodi Memorial and Mason hospitals; died Dec. 31, aged 69.

**Pobirs, Louis Jacob** ✙ New Bedford, Mass.; Tufts College Medical School, Boston, 1910; formerly on the staff of St. Joseph's Hospital in Providence, R. I.; died Dec. 18, aged 72.

**Reilly, John Joseph,** New York City; Bellevue Hospital Medical College, New York City, 1895; also held a degree in law; at one time an officer in the regular U. S. Army; died Jan. 5, aged 94.

**Robinson, Whitfield Lochinvar** ✙ Mars Hill, N. C.; Medical College of Virginia, Richmond, 1929; member of the American Academy of General Practice; past-president of the Madison County Medical Society; on the staffs of the Memorial Mission Hospital of Western North Carolina, Aston Park Hospital, and St. Joseph's Hospital in Asheville; died in the Medical College of Virginia, Hospital Division, Richmond, Dec. 18, aged 53, of meningitis.

**Siegel, Alvin,** Cranford, N. J.; New York University College of Medicine, New York City, 1951; interned at the Bellevue Hospital, New York City; formerly a resident at the Brooklyn Eye and Ear Hospital, Brooklyn, N. Y.; an associate member of the American Medical Association; certified by the National Board of Medical Examiners; died in the Mount Sinai Hospital, New York City, Dec. 8, aged 29, of peritonitis, partial intestinal obstruction, and ulcerative colitis.

**Steiner, Eric** ✙ Cicero, Ill.; Deutsche Universität Medizinische Fakultät, Prague, Czechoslovakia, 1922; died in the St. Anthony de Padua Hospital in Chicago Nov. 27, aged 59, of metastatic carcinoma of the thoracic vertebrae secondary to carcinoma of the lung.

**Stemm, William H.** ✙ North Vernon, Ind.; Medical College of Ohio, Cincinnati, 1887; served as mayor; past-president of the Indiana State Medical Association and served as councilor of the fourth district; past-president of the Jennings County Medical Society; president of the board of the Jackson County Schneck Memorial Hospital in Seymour, where he died Dec. 16, aged 95, of gastrointestinal hemorrhage.

**Venable, John Manning** ✙ San Antonio, Texas; Johns Hopkins University School of Medicine, Baltimore, 1914; specialist certified by the American Board of Urology; member of the American Urological Association; fellow of the American College of Surgeons; past-president of the Bexar County Medical Society; on the staffs of the Baptist Memorial Hospital, Santa Rosa Hospital, and Nix Memorial Hospital, where he died Dec. 15, aged 65, of acute myocardial infarction and coronary heart disease.

**White, Herman Chester** ✙ Washington, D. C.; University of Pennsylvania School of Medicine, Philadelphia, 1918; veteran of World Wars I and II; for many years associated with the Veterans Administration; died in the Georgetown University Hospital Dec. 15, aged 63.

**Wolcott, Helen Brown N.,** Rome, N. Y.; University of Minnesota College of Medicine and Surgery, Minneapolis, 1895; retired senior assistant physician at the Rome State School; died Dec. 8, aged 89.

**Yoho, Charles Elmer,** Pittsburgh; University of Pennsylvania School of Medicine, Philadelphia, 1916; died in the Allegheny General Hospital Sept. 15, aged 67.

# FOREIGN LETTERS

## AUSTRIA

**Motility of the Oviduct.**—At the meeting of the Austrian Society of Gynecology and Obstetrics, in January, J. Artner and H. Tulzer reported on the reaction of human oviducts in tissue culture to drugs affecting the autonomic nervous system. Similar experiments were made in women with the aid of insufflation. An increased peristalsis of the tubes by sympathetic stimulation was observed by both methods, but substances that act parasympathetically inhibit peristalsis. This reaction contrasts with that of most of the hollow organs with involuntary muscles but is logical in view of the fact that the conveyance of the ovum always occurs in the corpus luteum stage of the menstrual cycle, which is determined by the sympathic nerves.

H. Knaus stated that the demonstrated reaction of the human uterine tube in vitro to epinephrine is of no importance, since all the involuntary muscles react with an increased frequency of contractions and increased tonus. Only the uterine muscles of guinea pigs, rats, and mice react to epinephrine with decrease of contractions and complete relaxation. The oscillations registered during insufflation, which are usually interpreted as a result of tubal contractions, should not be compared with the curves obtained from the tube in vitro, since it is not a biological but a merely physical phenomenon, as R. Fikentscher and K. Semm have shown. These authors proved that the same oscillations occur when insufflation is carried out on a rubber model of the internal sexual organs and that, therefore, their occurrence is not conditioned by the contraction of the tubes but by the viscosity of the mucus in the hollow organs and by the elasticity of their walls. Furthermore, no organ with involuntary muscles moves so quickly as the oscillations of Artner and Tulzer's insufflation curves seem to indicate.

**Disorders of Evacuation of the Upper Urinary Tract.**—At the same meeting, F. Brandstetter and H. Haschek said that dynamic disorders of evacuation of the upper urinary tract may be due to several factors but that almost always one component is predominant. This may be inflammatory, toxic, nervous, hormonal, traumatic, medicamentous, or a functional disturbance of the kidneys or bladder. Prophylaxis and therapy should be regulated according to the presence of irreversible or reversible conditions. The reestablishment of ureteral motility and tonus is aided by disinfection of the urine in reversible conditions and by symptomatic treatment in irreversible conditions.

**Further Discussion of Ethyleneimine Quinone.**—At the meeting of the Society of Viennese Physicians on Jan. 11, 1957, Stacher corroborated E. E. Reimer's success in treating acute leukemia with ethyleneimine quinone (E-39). The drug was of no value in the treatment of bronchial cancer and lymphogranuloma. On the other hand, excellent results were obtained by local and intravenous treatment with E-39 of carcinosis of the pleura and peritoneum. E-39 therapy was discontinued in 1 of 17 patients when leukopenia occurred. Other patients who showed a decreased leukocyte count after having received 300 to 500 mg. of E-39 were given 15 to 30 mg. of prednisone. This prevented a sudden drop in the leukocyte count.

H. Chiari stated that, according to H. Holzner, marked degenerative changes in the tumor cells were observed after treatment with E-39, although the condition of patients with lymphadenosis showed no such changes. These changes are characterized chiefly by fatty degeneration and necrosis. This destruction of tumor cells is the purpose of treatment, but it may be accompanied by severe clinical symptoms. A 58-year-old man with cancer of the upper lobe of the right lung had a lobectomy two years before his terminal admission. Vague cerebral symptoms occurred, which led to the suspicion of metastasis to the brain. E-39 was given intravenously. Symptoms of severe cerebral pressure occurred after the second injection but subsided with adequate therapy. A severe recurrence was observed after a third injection of E-39, and the patient died. Autopsy revealed a solitary metastasis to the brain, with extensive necrosis. This was the only sign of cancer present. It is, therefore, assumed that a severe edema of the brain caused by the toxic action of the necrotic tissue was the cause of death. This assumption was supported by the fact that the edema was most severe close to the tumor and the fact that the increase in cerebral pressure closely followed the injection of the drug.

L. Stockinger reported on the action of E-39 on tumor cells in tissue cultures. The mitosis-inhibitory action is probably the result of a disturbance of the metabolism of nucleic acid of the cells. Pathological forms of mitosis were observed in these cells.

**Cerebral Abscess with Congenital Heart Failure.**—At the same meeting, H. Gund, of Ischl, reported on a 7½-year-old boy with Fallot's tetralogy. He had a parietal abscess of the brain on the left side and was operated on successfully. A second parietal cerebral abscess occurred 15 months later, this time on the right side. This also was cured. These abscesses were the paradoxical cerebral abscesses sometimes seen in patients with congenital heart failure, the primary focus of which is not found in the thoracic area, as in most metastatic cerebral abscesses. In some patients the focus is never discovered. No endocarditis is present in these patients. An infected thrombus reaches the brain directly (avoiding the lung) through a right-left shunt. Seventy patients with this condition were operated on, 10 with good results. The above-mentioned patient is the second who survived operation even after a second abscess developed. Energetic

The items in these letters are contributed by regular correspondents in the various foreign countries.

prophylaxis with the use of antibiotics even for insignificant infections and early repair of the cardiac lesion are important.

**Aerophysiology.**—At the same meeting, G. Schubert reported on the physiological considerations in rocket flights. Jet propulsion allows flights beyond the highest stratum of the earth atmosphere with a speed that far surpasses the speed of sound. The accelerations in the stage of vertical ascent are still limited and, therefore, endurable, but during the free flight state the crew is without gravity. Practical experiments have been made in parabolic jet flights (the force of gravity was overcome within 55 seconds). The conditions caused by the lack of gravity are harmless, except for some vestibular disturbances and disorders of coordination. Since pressure ventilation of the cabin is not possible, the cabin must be hermetically sealed. Some technical problems are still to be resolved. Protection of the cabin against the heavy nuclear components of the cosmic radiations is now possible; thus intercontinental rocket flight may soon become commonplace.

## PERU

**Endometriosis.**—In *Ginecología y obstetricia* (vol. 3, no. 3, 1956), J. Ahumada and co-workers review a series of 426 patients with endometriosis. Most patients were in their third to fifth decade. In 90.3% the disease affected only one organ. The authors classified the condition into the following groups: (1) mucous endometriosis, 63.6% of the cases, which included internal uterine and tubal involvement, 221 and 50 cases respectively; (2) serous endometriosis, 26.1%, which included ovarian and peritoneal involvement, 80 and 31 cases respectively; and (3) miscellaneous, 5.4%, which included endometriosis located in organs other than those mentioned above, 23 cases. In the remaining 21 cases, there was involvement of two or all three of the groups. The invasive proliferation of the basal tissue into the uterine muscle, observed in certain multiparous women, is not to be regarded as endometriosis, but it may so closely resemble uterine endometriosis that differential diagnosis is very difficult. Gross examination of the uterus during operations on this organ help to establish the correct diagnosis. Endometriotic lesions have indistinct boundaries. Differentiation from diffuse hyperplasia of the myometrium and from uterine myomas may be difficult through gross examination alone. Endometriosis may be nodular or diffuse. The former was present in 44.3% of the authors' cases and the latter in 55.7%.

Hormone-induced changes, similar to those shown by normal endometrium, have been shown to occur in the heterotopic tissues in some patients. The authors failed to show a frankly secretory pattern in the heterotopic endometrium of any of the 51 patients operated on during the luteinic phase of the menstrual cycle. On the other hand, in an attempt to discover whether estrogens play a role in the genesis of the endometriosis, the histology of the normal endometrium was studied in 135 of the 221 patients with intrauterine involvement. The results were as follows: 51 (38%) had secretory endometrium; 43 (31.8%) had proliferative endometrium; 14 (10%) had cystic glandular hyperplasia; 4 (3%) had simple hyperplasia; 16 (11.8%) had atrophic endometrium; 6 (4.4%) had carcinoma; and one (0.7%) had carcinoid hyperplasia. Thus a high percentage of patients had a normal, diphasic, menstrual cycle, in spite of the fact that most of the women were in the premenopausal age group.

Further evidence against the importance of hyperestrogenism as a factor predisposing to endometriosis was gained by a study of 37 patients with incipient uterine endometriosis, only 5 of whom had endometrial hyperplasia, while the ovarian function in the rest was apparently normal. In two patients endometriosis was associated with pregnancy. In them perforation of the uterus occurred at a zone with heterotopic endometrium in the course of a postabortion curettage. Malignant degeneration of endometriotic lesions has been reported to be rare. In the presence of advanced cases, it is difficult to determine whether the carcinoma is secondary to the endometriosis or the tumor originated independently. Carcinomatous endometriosis was found in four patients in this group; in three of them it coexisted with endometrial carcinoma, and in the other the malignant growth was detected only in the heterotopic tissue. Uterine sarcoma was found in two patients. In one the tumor originated in the heterotopic endometrium. Consequently, the condition of only about 0.5% of the patients in the series underwent primary malignant degeneration. In the 221 patients with intrauterine involvement the following gynecologic conditions were found: uterine myoma in 122 (55%); hemorrhagic metropathy in 31 (14%); adenoma in 32 (14.4%); pelvic inflammatory disease in 20 (9%); ovarian blastoma in 12 (5.4%); cervical carcinoma in 7 (3.1%); and endometrial carcinoma in 6 (2.7%). Only 42 patients had no other gynecologic condition. These patients complained of menorrhagia with or without pain, metrorrhagia, and hypogastric pain. Uterine endometriosis rarely causes sterility. A therapeutic test with androgens may be an aid to diagnoses, but it is a time-consuming procedure. Surgical removal is the treatment of choice, but it should be as conservative as possible.

Chocolate cysts are the most conspicuous manifestation of true ovarian endometriosis. Endometriosis on the ovarian surface is indistinguishable from peritoneal endometriosis and is included in this group. Histological diagnosis of chocolate cysts is easy when they are small and of recent development but not when they become large and old. In the authors' series, 57% of those patients with ovarian endometriosis had other gynecologic conditions, with uterine myoma being the most frequent (40 cases). The pain is the most prominent symptom in patients with ovarian endometriosis. Its intensity was related neither to the extension of the disease nor to the menses. The pain was aggravated during the menstrual period in only 25% of the patients. Painful abdominal crisis of sudden onset with or without fever and simulating a transient mild peritonitis may occur in these patients. This is caused by acute dissemination of the process to the pelvic peri-

toneum. Fever may be a misleading sign. Ovarian endometriosis is difficult to diagnose. It is often asymptomatic, but when it is symptomatic its clinical manifestations are variable. Conservative operation is the treatment of choice.

Tubal endometriosis was present in 50 patients; in 29, the condition involved the interstitial portion; in 7, the isthmus; in 8, the ampulla; and in 6, both the interstitial portion and the ampulla. In 66%, both oviducts were involved. In more than half the patients another gynecologic disorder was also present, with uterine myoma being the most frequent. Macroscopic diagnosis of tubal endometriosis is difficult and should be confirmed by histological study. The interstitial form is the form most frequently overlooked, because it is usually asymptomatic. Endometriosis of the ampulla and of the isthmus, on the other hand, caused symptoms in all cases. Painful menses and menorrhagia were reported by about half the patients and hypogastric pain not related to menstruation by all. As tubal endometriosis approaches the abdominal ostium, the tendency for symptoms to be present increases. Conservative operation is the procedure of choice.

Peritoneal endometriosis is rare. Frequently it constitutes an extension of external ovarian endometriosis. In most of the authors' patients, peritoneal endometriosis was accidentally found in the course of pelvic operations for other conditions. The variability of the symptoms of this variety of endometriosis makes its diagnosis practically impossible by clinical means. In the authors' series only five patients whose condition was not associated with other gynecologic conditions were found, all at operation. Surgical treatment of this condition, specially when multiple lesions exist, may be a puzzling problem. The surgeon, however, should try to extirpate as many of the lesions as possible. In this series there were 13 patients with vaginal endometriosis. This variety of endometriosis together with vesical and umbilical endometriosis are easily diagnosed.

## SWITZERLAND

**Psychosomatic Aspects of Tuberculosis.**—At the meeting of the Swiss Association for Tuberculosis in Bern, in November, Dr. Melzer of Germany said that psychic factors often alter the body's defensive reactions and predispose to the development of certain foci. Exploring the history of the patient during the period before the onset of the disease reveals the chronic conflicts that seemed to play a direct part in the reactions of the tissue. The fact that recurrence of the same difficulties is noted before every exacerbation of the disease is particularly significant. It is extremely difficult to specify the structure of the psychic conflicts and the character of the interactions between the psychic and somatic factors. Dr. Ott, of Solothurn, stated that the importance of psychosomatic factors was well illustrated by the sudden drop in the morbidity rate for tuberculosis that occurred in Holland at the end of World War II despite the fact that the material conditions were worse after the liberation than during the occupation. Dr. Cardis, of Lausanne, warned against generalized conclusions in view of the fact that everyone's life abounds in psychological conflicts but not everyone becomes tuberculous.

## UNITED KINGDOM

**Clean Air Act.**—The new year brought into operation certain provisions of the Clean Air Act, of 1956, which is the most comprehensive measure yet passed in this country to control atmospheric pollution and to abolish smog. The provisions enable local authorities to create smoke control areas, in which the emission of smoke from buildings will be an offense. Local authorities will be able to create these areas by orders that will be subject to confirmation by the Minister of Housing and Local Government. In the larger towns, smoke control will be undertaken in gradual stages over a period of years. Progress will be governed by the supply of smokeless fuels, the rate at which fireplaces can be converted, and the speed with which local authorities are able to formulate and carry through their plans for smoke control. It is hoped that there will be enough smokeless fuel available in the next few years for a substantial start to be made. In smoke control areas, grates and other appliances in which smokeless fuels cannot be burned satisfactorily will have to be altered or replaced. In houses, except those whose construction is started after July 5, 1956 (the date on which the act was passed), 70% of the cost of necessary adaptations, as approved by the local authority, will be borne by the local authority and the exchequer. Local authorities will also be able to make grants toward the cost of adaptations in churches, chapels, and charitable institutions.

All new furnaces, other than small domestic boilers, must be, so far as practicable, smokeless. Notice of intention to install such a furnace must be given to the local authority. The Minister is empowered to make regulations requiring furnaces to be fitted with smoke-density meters. The height of new chimneys, other than those of houses, shops, and offices, will require approval by the local authority. Owners of colliery spoil banks must use all practicable means for preventing combustion of refuse and for preventing or minimizing the emission of smoke and fumes from the refuse. Local authorities may make building bylaws requiring the provision in new buildings of such arrangements for heating and cooking as are calculated to prevent, so far as practicable, the emission of smoke. The remaining provisions of the Clean Air Act, which deal with the prohibition of dark smoke and the reduction of grit and dust from industry, will be brought into operation later.

**General Practitioner Courses for Students.**—In "A Follow-up Survey of the General Practitioner Schemes in Operation in British Medical Schools," published by the British Medical Students' Association, it is reported that of the 27 medical schools in the United Kingdom that offer facilities for clinical study there are 22 in which general practice schemes are either officially recognized or organized. These schemes are classified into four categories. First, there are the two health center schemes, Edinburgh and Manchester.

These are operated by the university authorities and provide teaching for students. Of the two, the Edinburgh center is the more elaborate. Attendance at a public dispensary for the treatment of the poor who are sick, in addition to visits to the homes of patients who normally attend such a dispensary, has been a compulsory part of the medical curriculum in this university for more than 100 years. On the introduction of the National Health Service in 1948, the university established the teaching of general practice in the premises of one of these dispensaries. In 1952, after the grant from the Rockefeller Foundation, this was converted into a general practice teaching unit, which was created as a separate entity. The unit consists of two general practices, with about 2,000 patients in each. Each practice is staffed by two physicians, one nurse, one almoner, and one secretary. The remaining staff consists of the director of the unit and a trainee who is a recently qualified postgraduate student and who holds the appointment for a year. From 12 to 15 students are taken into each practice for an academic term of 10 weeks. Each spends two afternoons a week attending the practice, but the amount of visiting that a student may undertake in addition to this is left to him to decide. As a rule, there are more applicants than there are vacancies, and the tendency is to take those students who are less likely to enter general practice, since it is believed that, while the vacancies are limited, it is all the more important that future specialists and occupants of clinical teaching chairs should have the benefit of this opportunity of acquiring an insight into the nature of general practice. Apart from attending a weekly seminar, each student may see the routine work of the well baby clinics. In addition, each student is allotted one consulting session each week, during which he is the only person present while the attending physician sees the patients who arrive without appointment. The student responsible for a patient or for a family visits them in their home, and at the end of his term he is expected to present a written case history, covering social as well as medical details for discussion by the group. Lectures are also given on general practice, some from the almoners and nurses. Other lectures are given on the actual running of a practice.

Second, there are the eight residential schemes in which the students spend some time living with the general practitioner, attending his office hours, and accompanying him on his rounds. Third, there are the 11 attachment schemes in which the student is attached to a general practitioner in the mornings for one to two weeks. He may manage, by arrangement with the general practitioner, to extend his visits to include the evening office hours also. Fourth, there is the day-visit scheme in which the student spends a day with the general practitioner.

**Cheese Standards.**—The term "processed cheese" should be applied only to the product obtained by heating cheese with or without the use of emulsifying salts, according to a report of the Food Standards Committee of the Ministry of Agriculture, Fisheries, and Food. The fat content should be wholly butterfat derived from cheese, and the only other ingredient should be the emulsifying salts and any water or coloring matter it is considered necessary to add during processing. Cheese spread, which is a compounded product, may contain in addition to cheese or cheeses other dairy products, such as butter and skim milk. The standards recommended for processed cheddar or Cheshire cheese are 48% in dry matter for the minimum butterfat content and 42% for the maximum moisture content. The comparable figures for processed cheese are 45% and 45%, and for cheese spread, 20% for the minimum butterfat content and 60% for maximum moisture content. The committee does not recommend the provision of a statutory limit for the emulsifying salts (usually sodium phosphates or sodium citrate) considered essential in the production of processed cheese and cheese spread, but it does consider that it should not be necessary to add more than 3% of emulsifying salts in processed cheese or cheese spread (the percentage relating to the weight of emulsifying salts in the anhydrous state).

**Chest Consultants and Smoking.**—The Council of the National Association for the Prevention of Tuberculosis issued a statement to the effect that those who smoke heavily should cut down on their smoking. Cigarette smoking indeed is a habit better not started. Young people should be discouraged from ever smoking the first cigarette. Those who live in towns should support the campaign to reduce atmospheric pollution from smoke and fumes, both industrial and domestic. Furthermore, by supporting mass radiography campaigns and encouraging friends and neighbors to have a chest roentgenogram of the lung, cancer can be discovered earlier and treated more successfully.

**Industrial Health and Accidents.**—The recently published annual report for 1955 of the chief inspector of factories shows that since 1954 the factory population has increased by 2.5%, the number of factories with mechanical power by 0.4%, and the number of accidents by 1.2%. On the other hand, the accident rate was the lowest yet recorded, the index being 89.2 (the 1950 rate being taken as 100). With the exception of a slight increase in 1953 the index has decreased every year since World War II. In spite of the continued increase in the number of accidents, the number of deaths has decreased steadily since 1951. In 1955 there were 703 deaths as compared with 828 in 1951. The accident rate for men was about 26 per 1,000 and for women about 10 per 1,000. The rates for boys and girls were about the same as the rates for men and women respectively. There were 255 cases of gas poisoning during the year, a figure that has remained fairly constant since the end of World War II. There were only 11 fatal accidents from gas poisoning, as against an average of 21 during the previous eight years. There were 583 (20 fatal) cases of industrial poisoning and diseases, compared with 483 (15 fatal) in 1954. Chrome ulceration accounted for the highest number of cases (26), followed by epitheliomatous ulceration (211, with 18 deaths). There were 69 cases of lead poisoning, and for the sixth successive year there were no deaths from it. There were no deaths among the 15 patients with anthrax.

# MEDICAL LITERATURE ABSTRACTS

## INTERNAL MEDICINE

**Myocardial Infarction in Young Males.** O. Roth and A. V. Pepe. Connecticut M. J. 21:12-15 (Jan.) 1957 [New Haven].

The authors observed 20 men between the ages of 32 and 40 years who had myocardial infarction due to atherosclerotic coronary artery disease. The clinical diagnosis in all of them was firmly established by a characteristic history; by the clinical aspects including increased sedimentation time, fever, and leukocytosis; and by characteristic electrocardiographic findings. Nineteen of the 20 were laborers or craftsmen, and 1 was a white collar worker. This predominance of manual laborers is in sharp contrast with other reports, which show a predominance of professional and managerial personnel among young patients with myocardial infarction. Fourteen of the 20 patients were heavy smokers, using between 40 and 100 cigarettes daily; 4 were moderate smokers, consuming 10 to 20 cigarettes daily; and only 2 did not smoke. This is a higher number of heavy smokers than would be found in a corresponding group of young men chosen at random. The alcohol intake did not seem unusual in this group. Coronary artery disease or other vascular disease was present in the families of 10 of these patients.

Most of the patients had elevated blood choloesterol and uric acid levels and a decreased blood iodine level and basal metabolic rate. Seventeen were overweight and 9 showed a heavy growth of hair, particularly on the chest and fingers. Only 2 showed hypertension, which improved greatly after their attack. None showed thyroid disease, diabetes, rheumatic heart disease, polycythemia, or familial hypercholesterolemia. Two had xanthelasma of the eyelids. Arcus senilis was present in 4. Eleven had their initial attack without warning; 9 had experienced angina pectoris on effort from 1 week to 9 years prior to their myocardial infarction. In 9 the attack came on while they were doing unusual work and in 2 while they were doing their usual work. In the remaining 9 the attack occurred while they were at rest. None of these 20 patients died, despite the fact that 1 developed cardiac failure and 2 had thrombophlebitis, 1 with a pulmonary infarct. All showed excellent functional recovery. Sixteen have returned to their previous or somewhat easier work. The incidence of coronary artery disease has increased in general and in young men particularly. Chest pain in young men therefore should be recognized as a possible indication of coronary artery disease.

**The Effect of Thyroid Ablation Upon Serum Cholesterol and Beta-Lipoprotein Spectrum.** W. H. Florsheim, M. E. Morton and J. R. Goodman. Am. J. M. Sc. 233:16-22 (Jan.) 1957 [Philadelphia].

The alterations in the serum lipid spectrum were studied for 6 to 44 months in 22 patients in whom hypothyroidism was produced with radioactive iodine ($I^{131}$). The patients were subdivided into 3 groups consisting of hyperthyroid patients, those with cardiac insufficiency caused by atherosclerotic heart disease, and those with rheumatic heart disease, Hand-Schüller-Christian disease, toxic goiter, or thyroid carcinoma. $I^{131}$ was administered in divided doses to avoid the possibility of a "thyroid storm." After the stabilization of the thyroid function the patients were maintained in a nonmyxedematous hypometabolic state with the aid of thyroid medication when necessary. Serum total cholesterol was determined either by Abell's method or by the method of Kanter and coworkers. Agreement between the 2 methods was satisfactory. The various beta-lipoprotein fractions were determined by the procedure of Gofer and coworkers.

Mild rises in total serum cholesterol and in Gofman's "atherogenic index" were observed in hyperthyroid patients rendered euthyroid by the administration of $I^{131}$. Such mild rises involve only minimal added risk of atherogenesis by Gofman's calculations. The changes observed after reduction of thyroid function in euthyroid patients without atherosclerotic heart disease were of similar magnitude. Greater rises in both serum total cholesterol and atherogenic index were sometimes observed in atherosclerotic patients after reduction of thyroid function. In some of the atherosclerotic patients the changes were minimal until a sudden exacerbation of the atherosclerotic process, 2½ years after the reduction of thyroid function by $I^{131}$, shown by a return of anginal pain and other clinical manifestations, caused a marked increase in the atherogenic index. There was a gradual increase of both serum cholesterol and beta-lipoproteins in other atherosclerotic patients. Changes in the lipoprotein spectrum did not always parallel changes in total serum cholesterol in this group of patients, and changes in the serum lipoprotein level were not restricted to the Sf 0-12 class.

At least 67% of the patients with cardiac insufficiency caused by atherosclerotic disease obtained dramatic relief of incapacitating anginal pain caused by

---

The place of publication of the periodicals appears in brackets preceding each abstract.

Periodicals on file in the Library of the American Medical Association may be borrowed by members of the Association or its student organization and by individuals in continental United States or Canada who subscribe to its scientific periodicals. Requests for periodicals should be addressed "Library, American Medical Association." Periodical files cover 1948 to date only, and no photoduplication services are available. No charge is made to members, but the fee for others is 15 cents in stamps for each item. Only three periodicals may be borrowed at one time, and they must not be kept longer than five days. Periodicals published by the American Medical Association are not available for lending but can be supplied on purchase order. Reprints as a rule are the property of authors and can be obtained for permanent possession only from them.

cardiac insufficiency. Aggravation of clinical status and biochemical criteria were observed in only 33% of the patients in whom reduction of thyroid function was produced with $I^{131}$. The periodic progression of atherosclerosis could easily explain these results. The excellent results obtained by Blumgart and also by the authors in rehabilitating patients through the relief of cardiac decompensation, congestive failure, and anginal pain justify any added small risk of increased atherogenesis.

**The Relative Importance of Allergic and other Factors in the Etiology of Bronchial Asthma.** P. Vallery-Radot, C. Laroche, P. Milliez, P. Blamoutier and N. T. Ky. Semaine Hôp. Paris 32:4095-4103 (Dec. 26) 1956 (In French) [Paris].

In a study of 803 cases of asthma, 53% were found to be of allergic and 34.3% of bronchitic origin; 5% were due to diseases of the respiratory, endocrine, vagosympathetic, or digestive systems. In 7.7% the etiology was uncertain. Allergic asthma was found to predominate in children. Of the cases of asthma occurring in children under the age of 9, 73.5% were on an allergic basis. In the older age group the allergic type became less important, so that in individuals over 60 years of age only 20% of the cases were of allergic origin.

Among the 427 cases of allergic asthma the most frequent cause was dust (55%). Of 238 cases in which there were positive skin tests to dust, 40 (17%) were due to dust only, 109 (46%) to feathers and dust, and 24 (10%) to hair and dust. Sixty-five (27%) were due to all 3. The criteria for allergic asthma were based on cutaneous and intradermal tests, eosinophil counts in the blood and saliva, and x-ray studies of the thorax.

**The "Protection Test" Used as an Aid in the Evaluation of Therapeutic Results Obtained in 100 Patients with Various Forms of Asthma.** R. Benda, L. F. Miravet and G. Gartenlaub. Presse méd. 64:2237-2238 (Dec. 26) 1956 (In French) [Paris].

The blood serums of 68 patients with asthma and of 32 patients with chronic bronchitis associated with dyspnea of asthmatic type were injected into guinea pigs, which were then exposed to histamine aerosols. The serums of 52 patients with asthma and of 12 patients with chronic bronchitis associated with asthmatic dyspnea did not give any protection to the guinea pigs against the histamine aerosols. The serums of these 64 patients, therefore, did not have any antihistamine properties. The serums of 16 patients with asthma and of 20 patients with chronic bronchitis associated with asthmatic dyspnea gave relative protection to the guinea pigs against the histamine aerosols. The serums of these 36 patients had reduced antihistamine properties. The 100 patients were then treated with injections of blood serums from normal persons ("protective serums"); some of the patients were given combined treatment with "protective serum" and prednisone and some were treated with prednisone alone. After the treatment, the serums of the patients were again injected in guinea pigs and the animals were again exposed to histamine aerosols. The serums of 59 patients who were benefited clinically by the treatment with "protective serums" provided increased protection to the guinea pigs against the histamine aerosols. The serums of 20 patients who were therapeutic failures did not change the reaction of the animals to the histamine aerosols. The results of the "protective tests" in the guinea pigs thus were consistent with the therapeutic results in 79 patients. The results of the "protective tests" in the animals differed from the therapeutic results obtained in the remaining 21 patients. Seventeen of the 21 patients were clinically improved but their serums did not change the reaction of the animals to the histamine aerosols; the reaction of the animals to the histamine aerosols was improved by the serums of only 4 patients who were therapeutic failures.

While the "protective test" was thus shown to afford in most cases responses that were consistent with the therapeutic results, there were a number of inconsistencies that apparently did not depend on the clinical type of the condition for which the patients were treated or on the treatment itself. The author gained the impression that the "protective serum" alone or combined with prednisone seemed to modify the "protective rate" more easily than the hormone treatment alone. Additional tests were performed on the isolated intestines of guinea pigs with the serums of 26 of the 100 patients before and after they had been treated for their asthma. These "captation tests" were done to determine to what extent the patient's serum may reduce the biological activity of a histamine solution with which it is brought in contact. The results of these tests proved to be less reliable than those of the "protective tests," and the reactions to "captation tests" occurred less rapidly than those to the "protective tests."

## SURGERY

**Tumors of the Brain: A Report on 288 Autopsies.** R. M. Klemme. J. Internat. Coll. Surgeons 27:54-60 (Jan.) 1957 [Chicago].

The author reports autopsy findings in 288 patients with brain tumors who were operated on between 1927 and 1952, some of whom died on the operating table while others survived up to 17 years without further symptoms attributable to the tumor. The type of brain tumors most frequently observed were glioblastoma multiforme in 98 patients, medulloblastoma in 34, astrocytoma in 25, perineural fibroblastoma in 19, meningioma in 19, and adenoma of the pituitary in 14. Patients with medulloblastoma underwent radical excision of the tumor followed by irradiation of the entire central nervous system. Irradiation therapy frequently gave prompt relief of pain and improvement of general physical condition in postoperative recurrence of medulloblastoma. Block resection, lobectomy, and hemispherectomy proved effective for the glial group of tumors (i.e., the recurrent type). The survival period in this group ranged from 2 to 11½ years without further symptoms. A diagnostic pro-

cedure of special value in recent years was the use of fluorescein dyes in combination with isotopes, injected intravenously, and localization of the lesion with a Geiger counter. No attempt was made to remove multiple lesions suggested by the Geiger counter record, and simple subtemporal decompression was resorted to. A single lesion was immediately removed.

Acute edema of the lung was the cause of death in 145 patients (50%), terminal bronchopneumonia in 56, myocardial collapse in 23, hyperpyrexia in 21, aspiration pneumonia in 14, edema of the pons in 9, general edema of the brain in 8, postoperative hemorrhage in 6, and surgical shock in 6. These data show that the operative mortality rate would drop by 50% if adequate satisfactory treatment were instituted to counteract acute edema of the lungs. The incidence of terminal pneumonia has been greatly reduced since the introduction of antibiotics and sulfonamides. Aspiration pneumonia occurred most frequently during World War II, primarily because of inefficient personnel. Edema of the pons occurred primarily in pontine lesions when a heroic effort was made to remove them. The incidence of unrecognized postoperative hemorrhage was low, and careful postoperative follow-up observations should eliminate this entirely. Evaluating and maintaining the fluid and electrolytic balance postoperatively should be most helpful in reducing operative mortality and complications, particularly edema of the brain and lungs. Water intoxication and an unrecognized depletion of sodium are effectively combated by administration of isotonic or concentrated solutions of sodium chloride. Continued attacks on pontine tumors should be encouraged despite the discouraging results with this type of lesion.

**Surgical Correction of Ventricular Septal Defect: Anatomic and Technical Considerations.** J. W. Kirklin, H. G. Harshbarger, D. E. Donald and J. E. Edwards. J. Thoracic Surg. 33:45-59 (Jan.) 1957 [St. Louis].

Thirty-six patients underwent surgical treatment of a ventricular septal defect at the Mayo Clinic, Rochester, Minn., between March 1, 1955, and April 15, 1956. The defect was "high," i.e., related to the ventricular outflow tracts, in 27 patients; it was inferior to the crista supraventricularis in 25 of these and superior to the crista supraventricularis in 2. The defect was "low," i.e., related to the ventricular inflow tracts, in 11 patients, 8 of whom had a defect beneath the septal leaflet of the tricuspid valve and 3 near the apex of the muscular septum; 2 of these 3 patients also had "high" ventricular defects and were, therefore, listed twice. Complete repair of the defect was obtained by various techniques in 20 of the 36 patients, satisfactory repair in 7, and a known residual shunt was present in 9. The technique used in the last 25 patients with defects related to the ventricular outflow tracts and being posteroinferior to the crista supraventricularis consisted of silk mattress sutures so placed that they grasped one side of the defect and passed through an appropriately trimmed piece of noncompressed polyvinylformal (Ivalon) sponge and then through the other edge of the defect. The line of closure was parallel to the direction of outflow from the right ventricle but was at right angles to the direction of outflow from the left ventricle. The opportunity for distortion of aortic valve leaflets was thus minimized. Complete repair was obtained with this technique in 18 patients, satisfactory repair in 4, and known residual shunts were present in 3. These data suggest that the technique described has been highly satisfactory. It must be slightly altered for other types of "high" ventricular defects, although the basic principles are the same.

A thorough understanding of the surgical anatomy of ventricular septal defects is essential to their successful treatment. Particular attention must be given to the variation in location of the defects. Exact knowledge of the relation of the defect to the aortic leaflets, mitral and tricuspid leaflets, and the bundle of His is of inestimable value. Emphasis is placed on the necessity for precision in the repair to avoid damaging adjacent structures and to ensure absolute and permanent closure. The routine use of potassium-induced cardiac asystole in the repair of ventricular septal defects has been recently adopted by the authors.

**Surgical Management of Cervical Carotid Aneurysms.** J. E. Thompson and D. J. Austin. A. M. A. Arch. Surg. 74:80-88 (Jan.) 1957 [Chicago].

The hazards associated with the treatment of carotid aneurysms in the neck stem from the cerebral complications of the ligation of the carotid artery. The authors report the histories of 6 patients, in whom the following 3 methods of treatment were used: 1. Four aneurysms of the carotid bifurcation were wrapped, 3 with fascia lata and 1 with cellophane, with relief of symptoms and curative results. 2. A saccular aneurysm of the internal carotid was cured by resection and arteriorrhaphy, with preservation of carotid flow. 3. A large aneurysm of the common carotid was treated by aneurysmectomy and arterial grafting between the innominate and the common carotid arteries after a previous operation of resection, arteriorrhaphy, and fascia lata wrapping had failed. The patient died, with a functioning graft and with no evidence of cerebral complications.

Small symptomatic aneurysms of the carotid bifurcation should be treated by fascia lata wrapping. Resection with restoration of carotid blood flow is the treatment recommended for other carotid aneurysms. This can be done by arteriorrhaphy, end-to-end anastomosis, or arterial grafting. The carotid occlusion tolerance test is helpful in determining whether the patient can tolerate carotid occlusion long enough for a graft to be inserted.

**Conservative Treatment of Bronchopulmonary Fistula After Pulmonary Resection.** C. Pacheco, E. Gongora, O. Rivero and L. Green. Gac. méd. Mexico 86:425-434 (Nov.-Dec.) 1956 (In Spanish) [Mexico, D. F., Mexico].

One hundred twenty-five patients had pulmonary resection for treatment of pulmonary tuberculosis, cancer, and cysts. A bronchopulmonary fistula developed in 15 patients. The fistula appeared between 2 and 20 days after the operation in all patients but 1, in whom it appeared 1 year after the operation. A diagnosis was

made by the clinical symptoms and roentgen signs in 1 case and by the method of instillation of methylene blue in all the others. The fistula followed pneumonectomy in 20% of the cases, upper lobectomy in 15%, and resection of the upper segment in 9%. The development of a bronchopulmonary fistula following pulmonary resection depends on the presence of a residual cavity. Control of the infection and of the mechanical conditions created by the cavity are of the same importance. A conservative treatment consisting of pleurotomy in most cases or of aspirating puncture and instillation of antibiotics resulted in either cure of the condition or stabilization of the fistula in 11 cases. A thoracoplasty was performed after stabilization of the fistula in 3 patients to close the residual cavity. The fistula did not benefit from pleurotomy in 4 patients, 2 of whom died from infection, 1 from hemorrhage of the pulmonary artery and 1 from tuberculous meningitis. The practice of conservative treatment of bronchopulmonary fistula does not interfere with the making of a surgical intervention (thoracoplasty or amplification of the resection) when these operations are indicated after stabilization of the fistula.

## NEUROLOGY & PSYCHIATRY

**Laughter in Epilepsy.** R. Druckman and D. Chao. Neurology 7:26-36 (Jan.) 1957 [Minneapolis].

Disorders of laughter in the form of forced laughter are widely recognized as occurring in organic brain syndromes such as pseudobulbar palsy, generalized cerebral arteriosclerosis, amyotrophic lateral sclerosis, and multiple sclerosis. Similar uncontrollable outbursts of laughter have also been reported following prefrontal lobotomy. It is less well known that laughter may be a manifestation of epilepsy. Eleven patients with laughter as an epileptiform manifestation are presented. The laughter varied from violent prolonged laughter lasting about 2 minutes to giggling and even grinning. The epileptic origin of the laughter was indicated by the lack of any external precipitant, by the nature of the laughter, by concomitant manifestations of epilepsy, and by response to anticonvulsant medication. The clinical and the electroencephalographic picture of these patients showed much variation but in general indicated the probability of an organic lesion of the brain as the causative factor. The authors discuss the possible role of the hypothalamus in the production of this seizure manifestation. They believe that laughter as an epileptiform manifestation is more frequent than would be suspected from the few reports in the literature.

**Collection and Examination of Patients with Cerebral Palsy in Bornholm.** E. Hansen. Bibl. læger 148:149-174 (No. 3) 1956 (In Danish) [Copenhagen].

All but one of 53 patients with cerebral palsy reported on here were examined by the author. Dysfunction of the neuromuscular apparatus was revealed clinically by spasticity, athetosis, ataxia, tremor, and rigidity, isolated or combined. Not a single case of pure athetosis was found. Slightly more than half the patients were aged under 15; 25 were adults. Satisfactory information as to pregnancy was available in 47 cases: 42 mothers had been well during the entire pregnancy, 1 had a mild myxedema, 1 mild diabetes mellitus, 1 nausea, indisposition, and vomiting, and 1 severe eclampsia of pregnancy. There was no evidence of heredity. In 23 cases there had been difficulty in delivery. Twenty-four cases were mild but needed treatment and control, 15 were moderate, and 14 were grave. Spontaneous rehabilitation is the exception. The number of new cases of cerebral palsy seen annually in Bornholm is estimated to be 2.2 per 1,000 births.

**A Comparative Study of Various Ataractic Drugs.** P. E. Feldman. Am. J. Psychiat. 113:589-594 (Jan.) 1957 [Baltimore].

The studies reported extended over 2 years and involved 1,450 drug trials on 1,238 patients. The drugs studied were chlorpromazine, a combination of chlorpromazine and reserpine, Frenquel, Pacatal, and Serpasil. The patients were an inpatient population of a state hospital and included a large number with very chronic cases, a high percentage having schizophrenic reactions. All 5 compounds tested appeared to be of some benefit. Chlorpromazine appeared to be the most generally effective and Frenquel the least. All drugs were most effective in early and least effective in the very chronic cases.

Large doses of drugs did not prove more beneficial than moderate doses. The incidence of side-effects was highest with chlorpromazine alone or combined with reserpine and lowest with Frenquel. The combination of chlorpromazine and reserpine did not follow the prediction that the good effects of each drug would be potentiated and the ill-effects merely additive; this combination produced a high incidence of serious untoward effects. It became evident that no single diagnostic category responds outstandingly to any one drug. Patients who do not respond to one drug may respond to another, and those who respond moderately to one may respond maximally to another. Hyperactivity, combativeness, and tension respond best to ataraxics. The response of insight, affect, judgment, and realistic planning is disappointing. The results obtained show that the ataraxic drugs are of value in the treatment of psychiatric disorders.

## PEDIATRICS

**Considerations on the Clinical and Roentgenologic Findings of the Skull in the Sequelae of Tuberculous Meningitis in Infancy.** E. Caffaratti and I. Lanza. Minerva pediat. 8:1423-1430 (Nov. 17) 1956 (In Italian) [Turin, Italy].

The clinical and roentgenologic findings of the skull in a group of 26 children who between the ages of 1 and 9 years had had tubercular meningitis were studied. All of the children received streptomycin

treatment. Observations made before the treatment, during the treatment, and 2 to 7 years after the beginning of the treatment were compared. The relationship between the roentgenologic findings and the sequelae of the latent disease are discussed. The children were divided into 3 groups according to the roentgenologic findings of the skull. The first group was composed of children with latent intracranial hypertension; 12 children showed marked and diffused accentuation of the digital imprints and slight but frequent widening of the diploic channels and of the sulci of the venous sinuses; 4 children also showed thinning of the bones. The signs present in these children were caused by an internal and latent hydrocephalic status. Psychic and neurological sequelae were present in 1 child only. This child had contracted meningitis at the age of 9 months and after recovery showed oligophrenia and motor ataxia. The second group was composed of 6 children who showed intracranial calcification; these patients had severe and prolonged forms of meningitis and neuropsychiatric sequelae. The authors believe that the intracranial calcifications are more likely to be present in patients treated when the meningitis is already advanced. Three of these 6 patients belonged to a group of 7 patients who had already an advanced severe form of meningitis when they were subjected to streptomycin therapy, and the other 3 belonged to a group of 19 patients who presented only a mild form of meningitis at the time that they received streptomycin. The third group was composed of 4 children with skull and face dimorphism, which, according to the authors, was caused by irritative inflammatory stimuli originating mainly in a flogistic condition of the ororhinopharyngeal or sinusal complex.

## THERAPEUTICS

**Experimental Research on the Resistance of Tubercle Bacilli and Their Virulence Under Chemotherapy.** G. Domagk. Ztschr. Tuberk. **109**:129-132 (No. 3) 1956 (In German) [Leipzig, Germany].

Resistance may develop against any of the drugs that are used in the therapy of tuberculosis. The resistance of tubercle bacilli to aminosalicylic acid (PAS) is similar to that to streptomycin, in that they may grow in nutrient mediums containing 0.1% or 1% of these drugs, whereas the growth of normal strains is inhibited by 1 part in 100,000 or even in 1 million. Resistance to thiosemicarbazone is not only much less frequent than that against streptomycin or aminosalicylic acid but is also much less intense, because at least a partial inhibition of growth is still demonstrable in concentrations of 1 in 10,000 or even 1 in 100,000. Isoniazid is from 5 to 10 times more potent than the thiosemicarbazone compounds and from 100 to 1,000 times more potent than streptomycin. However, tubercle bacilli become resistant even to this potent drug, and when this happens something occurs that has not been observed in the resistance to streptomycin, aminosalicylic acid, or thiosemicarbazone. A certain reduction in virulence becomes evident, in that much larger quantities of these isoniazid-resistant tubercle bacilli are necessary to induce infection in guinea pigs after intraperitoneal or inguinal injection than is the case when normal strains or strains resistant to streptomycin, aminosalicylic acid, or thiosemicarbazone are injected. It is difficult to say whether this loss of virulence plays a part also in human subjects, but clinical observations seem to indicate that this is the case. Therapeutic effects can still be obtained in patients who harbor tubercle bacilli that are resistant to isoniazid by giving either larger doses of isoniazid or by giving isoniazid in combination with thiosemicarbazone preparations. This might be due to the fact that, in addition to the resistant strains, normal strains are also still present.

A combination compound, Nicoteben, has been developed, in which 8 parts of isoniazid are combined with 2 parts of isonicotine-aldehyde-thiosemicarbazone. This compound is more effective and more readily tolerated than the thiosemicarbazone preparation, amithiozone (Conteben). The combination preparation, Nicoteben, has high therapeutic potency even against strains that are resistant to 2 drugs such as isoniazid and aminosalicylic acid or isoniazid and thiosemicarbazone. Tests on guinea pigs showed also that tubercle bacilli with resistance to 2 drugs are much less virulent than the strains resistant only to isoniazid. For this reason, it is questionable whether these organisms are still infectious either to the person harboring them or for persons in his environment. As long as this has not been definitely proved, however, the author feels that if such organisms occur they should be attacked by the addition of streptomycin or other chemotherapeutic substances. Combinations of isoniazid and thiosemicarbazone will greatly facilitate the correct dosage in the treatment of tuberculosis and will also minimize the development of undesirable secondary effects. Early treatment with the new drugs and combinations has been known to achieve even closure of tuberculosis cavities. Drugs such as isoniazid may prove suitable also for prophylaxis in persons who are in contact with tuberculous patients. This is indicated by experiments on guinea pigs and calves exposed to tuberculous infection.

**A Combination of Isoniazid and Nicotine-Aldehyde-Thiosemicarbazone (Tebafen, GT3) an Antituberculous Drug for Oral Administration.** J. Hirsch. Ztschr. Tuberk. **109**:133-135 (No. 3) 1956 (In German) [Liepzig, Germany].

The combination chemotherapeutic agent Tebafen, or GT3, consists of 4 parts of isoniazid and 1 part of nicotine-aldehyde-thiosemicarbazone and is prepared in 50-mg. tablets. The average dose used in many hospitals and in a number of countries over the past 4 years is 5 mg. per kilogram of body weight per day. This drug can be given orally as the basic therapeutic agent together with intramuscular injections of streptomycin or with intravenous infusions of aminosalicylic acid. The use of the parenterally administered drugs can be discontinued earlier than would be possible without the oral combination therapy. Furthermore, the oral administration of Tebafen permits prolonged

and, what is even more important, ambulatory chemotherapy of tuberculosis. This last factor makes Tebafen particularly valuable for routine combination chemotherapy in countries in which an inadequate number of hospital beds is available for patients with tuberculolsis.

## PATHOLOGY

**Adenocarcinoma of the Oesophagus.** D. W. Smithers. Thorax 11:257-267 (Dec.) 1956 [London].

In a series of 314 patients with primary carcinoma of the esophagus, 26 (8%) had adenocarcinomas; in 23 cases this was not associated with hiatus hernia and in 3 it was. The 23 patients without hiatus hernia are reviewed here. In one of these the adenocarcinoma was in the upper third of the esophagus, in 3 in the middle third, 8 involved most of the lower half, and 11 were confined to the lower third. It is difficult to be sure of the precise site of origin of all adenocarcinomas reaching the lower esophageal limit. There has been some confusion about the anatomic limits of the esophagus caused by introducing into the definition questions of the type of mucosal lining. The evidence that the 23 patients had in fact primary esophageal tumors is too strong to be easily explained away, although 15 seem to have reached to but not beyond the cardia. These 23 patients represent the minimum number with esophageal adenocarcinomas seen, for in those in whom there was any doubt or too little information the tumors were classified as gastric.

Many patients with adenocarcinomas of the lower esophagus have been seen in hospitals, but the belief that the mucosal change was constantly located and fixed at the anatomic junction of esophagus and stomach led to efforts to explain them away rather than to account for their presence. The knowledge that carcinomas of the gastric fundus readily spread to involve the esophagus led to the view that true esophageal adenocarcinomas either did not exist or were rare. The demonstration that the esophagus is not uncommonly lined for part of its length by gastric mucosa, and the increasing number of adenocarcinomas in the esophagus noted since interest in hiatus hernia was aroused, have changed this outlook. It is suggested here that esophageal adenocarcinoma is a not uncommon disease, that it occurs predominantly in mucosa that has failed to undergo squamous transformation, that its incidence increases in frequency from pharynx to stomach, and that there is a large group of true junctional adenocarcinomas that cannot reasonably be allocated to stomach or esophagus.

**The Spread of Prostatic Cancer.** L. M. Franks. J. Path. & Bact. 72:603-611 (Oct.) 1956 [Edinburgh].

This report is based on a study of the gross metastases in 53 patients with clinically diagnosed, histologically confirmed prostatic cancer who died. The method of examination—clinical, roentgenographic or post mortem (gross and microscopic findings)—has a bearing on the number of secondary deposits found. Thus, roentgenologic examination can be expected to reveal a larger number of bone deposits than would be found clinically, and as a rule autopsy will reveal a larger number than either. A distinction must also be made between unsuspected or latent prostatic cancer and clinically diagnosed or active cancer. Gross metastases are not likely to be found at autopsy in patients with unsuspected or latent carcinomas and in patients in whom tumor growth is controlled by endocine treatment and whose death (particularly in the elderly) is due to some unrelated condition. In patients dying of the disease, distant metastases are an almost invariable finding; as a general rule, the more thorough the search, the greater the number of metastases that will be discovered. Dissemination of prostatic cancer is probably early and widespread. The tumor may spread locally to involve bladder, urethra, seminal vesicles, pelvic bones, and, less commonly, the rectum. Distant metastases are most commonly found in the lymph nodes, bones, lungs, and liver. Bone metastases are most frequently found in lumbar vertebrae, pelvis, femurs, and ribs. This distribution may be related to the ease with which these bones can be examined. Bone metastases may occur through both vertebral and systemic circulations.

## RADIOLOGY

**Exfoliative Cytology as an Aid in the Differential Diagnosis of Gastric Lesions Discovered Roentgenologically.** C. E. Rubin and J. F. Nelson. Am. J. Roentgenol. 77:9-24 (Jan.) 1957 [Springfield, Ill.].

In most patients with gastric lesions the correct preoperative diagnosis can be made by the integration of the roentgenologic, cytological, gastroscopic, and clinical findings. The authors present a number of cases that were selected because they presented a problem to the radiologist and clinician and because they illustrate the usefulness as well as the limitations of the gastric cytological method. Personnel experienced in the use of this method achieve an accuracy rate of from 80 to 90%. Forty-nine of 56 proved gastric cancers studied by the authors were correctly diagnosed by cytological examination prior to operation. The procedure is reliable only if the patient has been properly prepared to ensure that his stomach is free of food and detritus. Furthermore, efficient methods must be used to obtain the cells before they become digested. Various collection techniques have been proposed that use abrasion or enzymes to promote exfoliation. Gastric lavage with a buffered solution of the enzyme chymotrypsin is the method now used routinely in the authors' laboratory.

It is in the difficult case that cell study is of greatest value. Gastric exfoliative cytology is useful in differentiating benign from malignant gastric ulcer and in distinguishing heavy folds from infiltrative cancer. It may help establish the cause of a narrowed antrum. Isolated gastric lymphomas may be definitely diagnosed prior to operation or radiation therapy. The cytological method also has a definite place in the diagnosis of fundal lesions. All patients with perni-

cious anemia should have annual roentgenologic, gastroscopic, and exfoliative cytological studies to discover premalignant polyps and curable gastric carcinomas.

**The Importance of Angiocardiography for Visualizing the Thoracic Aorta.** I. Steinberg and N. Finby. A. M. A. Arch. Surg. 74:29-38 (Jan.) 1957 [Chicago].

In angiocardiography, the intravenous method of visualizing the cardiovascular system, strict adherence to the technical details regularly results in opacification of the thoracic aorta. Aortography by left auricular, left ventricular, or aortic puncture or by catheterization is technically more difficult and carries a greater risk and should not be used routinely. This paper reiterates the practicality for aortic visualization of angiocardiography, which is accomplished by making a rapid injection (1½ seconds) of a concentrated organic iodide solution into the arm vein. Speed of injection is essential and is achieved by the use of a special needle-stopcock unit of 12 gauge and a special 50-cc. Luer-Lok syringe with 12-gauge tip and by injection of the contrast substance during inspiration with the arm elevated. Sodium acetrizoate (Urokon sodium), 70%, has been found to be a contrast medium with few side-effects and reactions. The dose of sodium acetrizoate for children is 1 cc. per kilogram of body weight; for adults, depending on weight, it is between 35 and 50 cc.

Opacification of the thoracic aorta by the intravenous method of angiocardiography has proved helpful in the diagnosis of almost all aortic disorders. Failures to visualize the cardiovascular structures by angiocardiography are due to lack of attention to a few physiological details. It is essential to add the contrast material rapidly. The patient must be instructed to avoid unconscious performance of the Valsalva maneuver, which shuts off blood flow into the superior vena cava and dissipates the contrast material into the collateral veins. Undue elevation of the arm may exaggerate the physiological point of constriction of the subclavian vein and prevent the entrance of the contrast material. Angiocardiography is preferred to direct aortography for several reasons, but chiefly because general anesthesia is unnecessary, the dangers inherent in chamber and great vessel puncture are avoided, and study of the entire cardiovascular system is secured.

**The Roentgen Features of Fibrous Dysplasia of the Skull and Facial Bones: A Critical Analysis of Thirty-nine Pathologically Proved Cases.** J. W. Fries. Am. J. Roentgenol. 77:71-88 (Jan.) 1957 [Springfield, Ill.].

Prior to 1938, when Lichtenstein introduced the term "fibrous dysplasia," a confusing nomenclature existed; many of the synonymous terms are still being used. The author lists more than a dozen of these. He subjected 39 patients with fibrous dysplasia of the skull and facial bones to critical analysis. Requirements for inclusion in this study were (1) satisfactory roentgenograms of the skull and facial bones, (2) an adequate clinical record, and (3) microscopic confirmation. The basic tissue disturbance of fibrous dysplasia exists in the bone and consists in the ability of fibrous tissue to form bone directly (metaplasia). When fibrous dysplasia involves the skull or facial bones, the roentgenographic examination shows 3 forms: pagetoid, sclerotic, and cyst-like. The pagetoid type, in contrast to the other 2, is the most common, involves the greatest number of bones, occurs in a slightly older age group, and presents symptoms of longer duration.

Eleven patients showed involvement of 1 cranial or facial bone (the monostotic form), whereas the other 28 had the polyostotic form. The most common symptom was swelling or asymmetry of the cranium or face, occurring in 31 of the 39 patients. Twelve patients had unilateral proptosis. In all of these patients the frontal bone and in 11 the sphenoid bone was involved. Six patients had nasal symptoms, the most constant being obstruction. The ethmoid bone was involved in all patients and the lacrimal bone in 5. Pain occurred in about half of the patients, but it was difficult to evaluate. Severe mental disturbance was observed in 2 patients with extensive lesions in the frontal bone. The bony encroachment on the frontal lobes with resultant atrophy is a logical explanation.

## PHYSIOLOGY

**Evidence and Meaning of Acclimatization to Cold in Man.** J. LeBlanc. J. Appl. Physiol. 9:395-398 (Nov.) 1956 [Washington, D. C.].

Ten soldiers were transferred from Winnipeg to Churchill, Manitoba, Canada, at the end of October. They lived outdoors for approximately 12 hours a day, 6 days a week, from the end of November, 1954, until April, 1955. Every day they walked 10 miles during the day, and at night they stood motionless for periods of 2 to 3 hours, simulating night watchkeeping conditions. They were experiencing great thermal discomfort under these conditions. This group is referred to as the "acclimatized" group, and 6 laboratory employees who spent only about half an hour outdoors per day are referred to as "nonacclimatized." The soldiers exposed for 4 months to the Arctic winter climate showed evidence of acclimatization. This was revealed by exposing these subjects 3 times through the winter to the same standard cold stress. At the end of the winter the increased heat production caused by this standard cold exposure was not as large as in the fall. Since the same observations were made by different workers on laboratory animals, this result is interpreted as evidence of acclimatization to cold. The hypothesis of Carlson and his associates that acclimatization is effected by a decreased "core" and an increased "shell" of the body is not completely substantiated by these results. It is suggested that acclimatization is associated with a lowering of the body "thermostat" to more economical levels.

# BOOK REVIEWS

**Concise Anatomy.** By Linden F. Edwards, Ph.D., Professor of Anatomy, Ohio State University, Columbus. Second edition. Cloth, $7.50. Pp. 502, with 319 illustrations. McGraw-Hill Book Company, Inc., 330 W. 42nd St., New York 36; 95 Farringdon St., London, E. C. 4, England, 1956.

The second edition of this book follows the same plan as the first in devoting a preliminary section of 102 pages to general anatomic information and the remaining 373 to specific descriptions of the extremities, the head, the neck and trunk, and the viscera. There is an abundance of well-labeled illustrations, and the text is printed with two columns to the page. These features will be appreciated by students. To the purely anatomic material, the author has added interesting items from physiology and pathology under the heading "Applied Anatomy" at the end of each chapter. This means touching at times on some large and controversial subjects and undertaking the formidable task of formulating statements both brief and accurate. In this the author has been remarkably successful, except, perhaps, on page 3, where one finds the surprising statement that the gastrointestinal tract of a person of the pyknic type usually manifests "marked tone and motility made possible by the spaciousness of the abdomen." This is part of the new folklore of somatotyping, which badly needs critical appraisal. The index of this book shows signs of having been prepared with more than the usual amount of care. The convenient size of the book justifies its title.

**Advances in Pediatrics. Volume IX.** Editor: S. Z. Levine. Associate editors: John A. Anderson et al. Cloth. $9. Pp. 336, with illustrations. Year Book Publishers, Inc., 200 E. Illinois St., Chicago 11; Interscience Publishers, Ltd., 2a Southampton Row, London, W. C. 1, England, 1957.

In this volume, as in previous ones in this series, pediatric topics are comprehensively covered by experts. The seven subjects discussed in this volume are postmaturity, the gamma globulins, thyroid disorders in childhood, familial dysautonomia, use of fluoride compounds in prevention of dental caries, coagulation disorders in infancy and childhood, and celiac disease. An evaluation of recent contributions to the subject under discussion is included for each topic. The material is presented in such a manner as to give those unfamiliar with the subject an initial understanding and then to enable them to follow a detailed discussion. While the book is directed primarily toward pediatricians, all the clinical entities discussed would interest the general practitioner, and various specialists could also use the book as a reference. The abundant illustrations, figures, and tables add to the quality of the presentation. While basically a reference volume with an abundant bibliography, the book provides sufficient variety to warrant general reading for practitioners and should give the medical student an excellent foundation in the field.

---

These book reviews have been prepared by competent authorities but do not represent the opinions of any medical or other organization unless specifically so stated.

**Handbuch der inneren Medizin.** Herausgegeben von G. v. Bergmann, W. Frey und H. Schwiegk. Begründet von L. Mohr und R. Staehelin. Band IV: Erkrankungen der Atmungsorgane. Redigiert von W. Löffler. Erster Teil: Allgemeiner Teil. Bearbeitet von A. Brunner et al. Zweiter Teil: Spezieller Teil I. Bearbeitet von F. Escher et al. Dritter Teil: Spezieller Teil II. Bearbeitet von W. Behrens, Jr. et al. Vierter Teil: Spezieller Teil III. Bearbeitet von G. Jaccard et al. Fourth edition. Cloth. 729 marks; by subscription 583 marks. Pp. 668, with 264 illustrations; 1548, with 477 illustrations; 932, with 270 illustrations; 1032, with 233 illustrations. Springer-Verlag, Reichpietschufer 20, (1) Berlin W. 35 (West-Berlin); Neuenheimer Landstrasse 24, Heidelberg; Göttingen, Germany, 1956.

As the editor of these four volumes points out, the third edition of this work was, on account of conditions resulting from World War II, incomplete in that it contained no section on diseases of the respiratory tract. The work is not a handbook but a system. The first volume deals with general principles: the anatomy and abnormal physiology of the respiratory system, the methods of testing respiratory changes and of interpreting the results, and the forms and classification of pulmonary insufficiency and the clinical manifestations. Sections follow on general symptoms and the significance of sputum, roentgenographic, and leukocyte examinations in pulmonary and bronchial diseases. There are discussions of cardinal symptoms such as cough, hemoptysis, chest pain, cyanosis, and dyspnea; of the influence of heredity and constitution; and of methods of therapy, including operation; and there are detailed sections on special types of pulmonary disease and methods of investigating them. The second volume discusses diseases of the nose, pharynx, and larynx, including those that may complicate infectious diseases, circulatory abnormalities, and blood dyscrasias. Lengthy discussions on deformities of the thorax, circulatory disorders of the lung, tracheal and bronchial stenosis, different forms of bronchitis, bronchiectasis, the mechanical aspects of lung function, the various types of pneumonia, pulmonary abscess and gangrene, and eosinophilic infiltration of the lungs complete the volume.

The third volume deals with the various aspects of pulmonary tuberculosis, sarcoidosis, fungous infections of the lung, and the pneumoconioses and lymphogranulomatoses of the lung and mediastinum. The fourth volume discusses tumors of the lung, pleura, and chest wall; diseases and tumors of the mediastinum; diseases of the thymus; and diseases of the diaphragm. This is followed by a name index and a subject index.

There are extensive references after each important section. Many sections are written by the editor, and some by Swiss and a few by German clinicians. The descriptions of disease are written in clear and readily understandable German. The discussions are printed in type of satisfactory size, but rather small type is used in the description of some of the illustrations. The few colored plates are excellent. The books are printed on fine quality paper and are attractively bound. The work is a mine of useful information and should serve as an excellent reference work in any medical library.

# QUERIES AND MINOR NOTES

## TREATMENT OF PERSONS WITH POSITIVE SEROLOGIC TESTS FOR SYPHILIS

To the Editor:—*A patient had a positive serologic test for syphilis and, after this, had a positive Treponema pallidum immobilization test. There is no clinical evidence of any active or latent syphilis. Should this person receive any treatment? If so, please outline specific therapy.* *M.D., Illinois.*

Answer.—A patient with repeatedly positive reactions obtained with the standard serologic tests for syphilis corroborated by positive reactions with the T. pallidum immobilization test should be classified as having or having had syphilis. He should be carefully requestioned and reexamined for any clinical or anamnestic evidence of congenital or acquired syphilis. He should also be subjected to an examination of his cardiovascular and central nervous systems for any evidence of syphilitic involvement. Therapy would depend on the results of these examinations and the amount and type of treatment previously received. For patients with latent syphilis, a course of 6 to 9 million units of repository penicillin in divided doses of 600,000 units administered two or three times weekly is adequate.

## TREATMENT OF TUBERCULIN REACTORS WITH NO CLINICAL EVIDENCE OF DISEASE

To the Editor:—*What is the treatment, if any, of a child with a positive tuberculin test (patch) and in whom there is no evidence on either physical or x-ray examination of any clinical tuberculous infection? This refers particularly to a child who had a negative tuberculin test the previous year.*

*M.D., Illinois.*

This inquiry has been referred to two consultants, whose respective replies follow.—Ed.

Answer.—There is considerable divergence of opinion regarding the necessity of treating children in whom the only evidence for tuberculosis is a positive tuberculin test. Assuming that treatment is desirable, any two of the following three drugs would constitute adequate therapy: streptomycin, 20 mg. per kilogram of body weight two or three times weekly; isoniazid, 5 to 10 mg. per kilogram per day by mouth; and aminosalicylic acid (PAS), 1 gm. per 45 kg. of body weight per day. Such treatment should be continued for a total of 18 to 24 months.

Answer.—Usually no special treatment is given for a child found to react to tuberculin with no other evidence of tuberculosis if the reaction occurs on the first test. However, if tuberculin tests have been administered periodically so the infection is known to have occurred recently, or if the child reacts when first tested and is only 1 or 2 years old, administration of antituberculosis drugs may be considered. While such treatment is now being administered on a rather large scale, not only for children but also for adults who have recently converted from nonreactors to tuberculin reactors, nowhere have observations been conducted for a sufficiently long period to justify conclusions concerning the efficacy of this treatment. Therefore, it is impossible to make a recommendation at this time with certainty of accomplishing the desired results.

Although most tuberculous lesions are microscopic and vascular when one is first able to elicit allergy by the tuberculin reaction, present evidence indicates that drugs now in use are not germicidal, and therefore tubercle bacilli are not destroyed. However, they may suppress tubercle bacilli so they do not liberate tuberculoprotein. Earlier it was thought that, if drugs were administered to a recent tuberculin converter and the individual later reverted (became a nonreactor to tuberculin), it was good evidence that all tubercle bacilli had been destroyed and the individual was cured in the strict sense of the word. However, if tubercle bacilli are so depressed that enough tuberculoprotein is not being liberated to maintain allergy, one might expect reversion to occur as though the organisms were dead.

Tubercle bacilli from resected lesions of persons who have had prolonged administration of antituberculosis drugs often show no growth in culture medium and do not produce disease in guinea pigs at the usual time. However, when such culture mediums have been kept incubating, colonies have appeared in considerable number. Even if all tubercle bacilli are not destroyed, it is thought that by keeping them suppressed there is much less likelihood of acute clinical forms of disease, such as meningitis, miliary disease, and pneumonia, developing, as they occasionally do soon after tissues become allergized. This alone is thought by some physicians to justify use of drugs in recent tuberculin converters.

The usual dose of streptomycin or dihydrostreptomycin for adults is 1 gm., administered intramuscularly about every three days. Isoniazid (from 5 to 8 mg. per kilogram of body weight) is given by mouth in three of four equal doses daily. Aminosalicylic acid is also administered by mouth, 12 gm. daily, in four equal doses. For children, doses are scaled down according to the age and size of the child on the basis of the usual dosage rule.

It is considered unwise to administer a single drug, because tubercle bacilli are likely to become resistant to it in a relatively brief time. Two drugs administered simultaneously give better results than either one alone, and this combination delays emergence of resistance of bacilli. A combination of any two of the three major drugs is satisfactory. It is probably never

---

The answers here published have been prepared by competent authorities. They do not, however, represent the opinions of any medical or other organization unless specifically so stated in the reply. Anonymous communications and queries on postal cards cannot be answered. Every letter must contain the writer's name and address, but these will be omitted on request.

wise to use all three of them simultaneously except in emergencies such as the occurrence of meningitis and miliary disease, since bacilli could become resistant to all and, if serious clinical disease should later develop, one would be forced to use less effective drugs. If one begins drug treatment of a recent converter, it should be continued at least 6 months, or 12 months may be even better.

## PROLONGED PENICILLIN SENSITIVITY

To the Editor:—*A 73-year-old man had always been well, although he had a positive Kahn test. He developed an upper respiratory infection and was given 300,000 units of penicillin S-R-D (procaine penicillin and buffered crystalline penicillin with dihydrostreptomycin and streptomycin) on two successive days. Two days later he developed a weeping exfoliative dermatitis. In the hospital he was given 40 units of corticotropin (ACTH) every second day, with healing of the dermatitis. The dose was reduced to 10 units daily, which resulted in another flare-up of weeping and exfoliation. When 40 units is given every second day, there is still a flare-up on the day no corticotropin is given, but 20 units daily keeps him in good condition, with healing of the skin lesions. How can the administration of corticotropin be stopped? When the dose is decreased, the exfoliative dermatitis again flares up, and the weeping is sufficient to wet the bedding and other clothing.*

*H. R. Cobb, M.D., Kalamazoo, Mich.*

Answer.—The effects of penicillin sensitization may remain and recur over a prolonged period. It might be attempted to switch this older man to therapy with steroids. They may be given by mouth, and with the newer ones there is less problem of salt retention, potassium loss, and edema. There is more flexibility in controlling the dose. A few patients, however, do better with corticotropin than with the corticosteroids. This man may be one of them. It goes without saying that other measures used in conjunction with prolonged therapy with corticotropin, such as potassium administration, must be employed. Perhaps moderate doses of testosterone for a short while would help the patient gain energy during convalescence. Antihistamines may be helpful. Therapy need not be pushed to the point of blotting out all symptoms. Compromise may be wiser for this older patient, provided careful watching prevents any decided relapse. Any exacerbation should be countered promptly by an increase in the dose of hormone. This is followed again by gradual reduction to compromise maintenance. Other useful dermatological measures should be employed to make the patient comfortable. Soothing baths, emollient applications, and antipruritic measures should be helpful adjuvants. Complications, such as pneumonia, should be watched for, and measures should be taken to prevent penicillin administration in the future.

## RECURRENT FACIAL SEBACEOUS CYSTS

To the Editor:—*A 27-year-old secretary complains of chronic recurrent facial sebaceous cysts, which have been treated by excision. She is otherwise healthy. At the onset of these cysts no cosmetics were used. Is there any special form of treatment that would relieve this condition? Would dietary restrictions on fats help in any way?*

*Elmer E. Kramer, M.D., New York.*

Answer.—There is no known prophylactic treatment for sebaceous cysts. After the cyst develops, a surgical approach is advisable. On the face, perhaps simple incision followed by pressure to remove the contents and sac is preferred because there is less scarring than after excision or clean dissection of the cyst. The lesser scarring is due to the size of the incision necessary to open the cyst as contrasted to that required to remove the entire sac intact. Often the sac can be delivered through a tiny incision if pressure is applied to the sides. Trichloroacetic acid, later neutralized with alcohol, can be inserted in the wound to control bleeding and to cauterize any portion of the cyst wall that remains. After this procedure, a subcutaneous nodule will remain for about one month but will disappear spontaneously without further treatment. While the failure rate is higher with this method than with adequate excision, it is usually successful. Failures can be treated by a more extensive surgical procedure later. At times, multiple sebaceous cysts are part of an acne. In such instances, control of the acne by x-ray therapy, diet, and local remedies is indicated. Dietary restrictions would be of no benefit unless there was an associated acne.

## INTERVALS BETWEEN DPT IMMUNIZATION

To the Editor:—*In the Dec. 29, 1956, issue of* The Journal, *page 1676, "Intervals Between DPT Immunization" was discussed under Queries and Minor Notes. It is my associates' and my understanding that the diphtheria and tetanus toxoids and pertussis vaccine combined are to be given at three intervals, four to six weeks apart, to obtain maximum immunity and that a maximum interval of four months between injections was acceptable. This reply says, in effect, that 6-to-12-month intervals are also effective. I would appreciate some confirmation of the idea that injections at 6-to-12-month intervals are effective in producing an adequate immunity.*

*Frederick J. Chapin, M.D.*
*Allen Medical Building*
*Bay City, Mich.*

The above letter was referred to the consultant who answered the original inquiry, and his comments follow.—Ed.

To the Editor:—*There is ample immunologic evidence that once an individual has been sensitized to diphtheria toxin or toxoid he will respond rapidly even years later to very small doses of toxoid. This sensitization is brought about by the initial or "priming dose" of the three antigens. Accordingly, good responses ultimately will be obtained when toxoid is injected at intervals of 6 to 12 months, for example. For practical purposes, however, it is desirable to bring about a status of immunity as quickly as possible, hence the usual interval of four to six weeks between injections in the initial series of three. The "maximum interval of four months be-*

*tween injections" referred to is an arbitrary figure, designed, presumably, to discourage delays in completing immunization.*

## TRAUMATIC AMPUTATION OF FINGER TIP

To the Editor:—*In Queries and Minor Notes in* The Journal *for Dec. 1, 1956, page 1352, a question was asked concerning the approved method for immediate definitive treatment in traumatic amputation of the finger tip in a 35-year-old aircraft worker. I should like to add to the answer given by your consultant. No mention was made of treatment to prevent the formation of neuromas in the digital nerves in the amputation stump. This point was stressed in an article by Simon and Silver* (Bull. Hosp. Joint Dis. 12:55, 1951). *We believe that these should be treated in the operating theater with the patient under general anesthesia and with torniquet control. The digital nerve stumps should be dissected free and sectioned under tension to retract from the wound so that scar tissue will not adhere to the digital nerves and result in the painful digital neuromas. This should be done before the skin graft (a full-thickness or a pedicle graft) is attempted. This is also discussed by Bunnell, in "Surgery of the Hand" (ed. 3, Philadelphia, J. B. Lippincott Company, 1956).*

*Stanley D. Simon, M.D.*
*225 Waterman St.*
*Providence, R. I.*

The above comment was referred to the consultant who answered the original inquiry, and his comments follow.—Ed.

To the Editor:—*This point is well taken, and, if the amputation is through the base of the pulp, it is necessary to draw down the nerve and cut it off high so that it will not end in scar tissue and form a painful neuroma.*

## EXPOSURE TO RADIATION DURING FLUOROSCOPY

To the Editor:—*In the Query and Minor Note on "Exposure to Radiation During Fluoroscopy" in* The Journal *for Feb. 2, 1957, page 410, the inquiry concerning fatigue in a radiologist raises a question that I would have welcomed the chance to discuss.*

*The x-ray beam ionizes the air through which it passes. Is there any evidence of the complete innocence of this air? It has been my impression that, unless the room where radiation is present is properly ventilated (a window suction fan is minimal equipment for this), symptoms may supervene. As I understand it, this need have no relationship to the dose, which may be absorbed.*

*S. A. Klein, M.D.*
*50 Park Ave.*
*Rutherford, N. J.*

The above letter was referred to the consultant who answered the original inquiry, and his comments follow.—Ed.

To the Editor:—*As far as is known, the ionized air in a radiographic or fluoroscopic room is harmless, especially with the small amount of irradiation used in ordinary x-ray procedures. It is well to have a fluoroscopic room well ventilated, as fatigue may occur at the end of the day, after long hours of fluoroscopy. In former years, when overhead open aerials were used, oxides of nitrogen were produced by the corona, and fatigue and occasionally nausea followed. These reactions have been obviated by shockproof equipment with no open aerial system. Ionized air may be harmful if very large amounts of irradiation are used with high intensities.*

## BIOLOGIC FALSE-POSITIVE SEROLOGIC REACTIONS

To the Editor:—*I would like to comment on the discussion of biologic false-positive serologic reactions that appeared in Queries and Minor Notes in* The Journal, *Feb. 9, 1957, page 516. Taken together, the answers of the two consultants very nicely handled the situation in regard to the current knowledge available on biologic false-positive serologic reactions; however, one of the consultants did not comment upon the evidence concerning the increased incidence of syphilis, and the other consultant did so only in part. The second consultant's comments on the first increase in eight years of reported cases of infectious syphilis is correct if he specifically had in mind primary and secondary syphilis. Admittedly this is disturbing, as it is usually considered that these stages of the disease are sensitive indicators of the attack rate. An increased attack rate is, however, only part of the story. Another sensitive indicator of this area of the incidence situation is reported congenital syphilis. Here again, for the fiscal year 1956 more cases of congenital syphilis were reported than in the prior fiscal year. Of considerable significance is the additional fact that, during the fiscal year 1956, 4,144 more new cases of syphilis were reported than in the prior year. This represented the first time in eight years that there had been an increase in the total number of reported cases of syphilis in the United States. If we not only consider the number of cases of syphilis reported but also look at the trends of the rates per 100,000 population for syphilis out of this reporting group, we note the even more disquieting fact that the fiscal year 1956 represented the first time in 12 consecutive years that there was an increase in the total rate of syphilis in the United States. The above observations taken together would certainly lend strength to the argument that there is evidence of an increase in the incidence of syphilis in this country. It might suggest that physicians offer still greater support and cooperation in reporting venereal diseases and in aiding local agencies in their epidemiologic pursuits concerning patient contacts. In the past it has been said that the private practitioner of medicine was the backbone of the organization necessary to break the chain of infection in syphilis and control this disease. It is probably truer today than ever before.*

*Warfield Garson, M.D.*
*University of North Carolina*
*Chapel Hill, N. C.*